Post Office telecommunications journal

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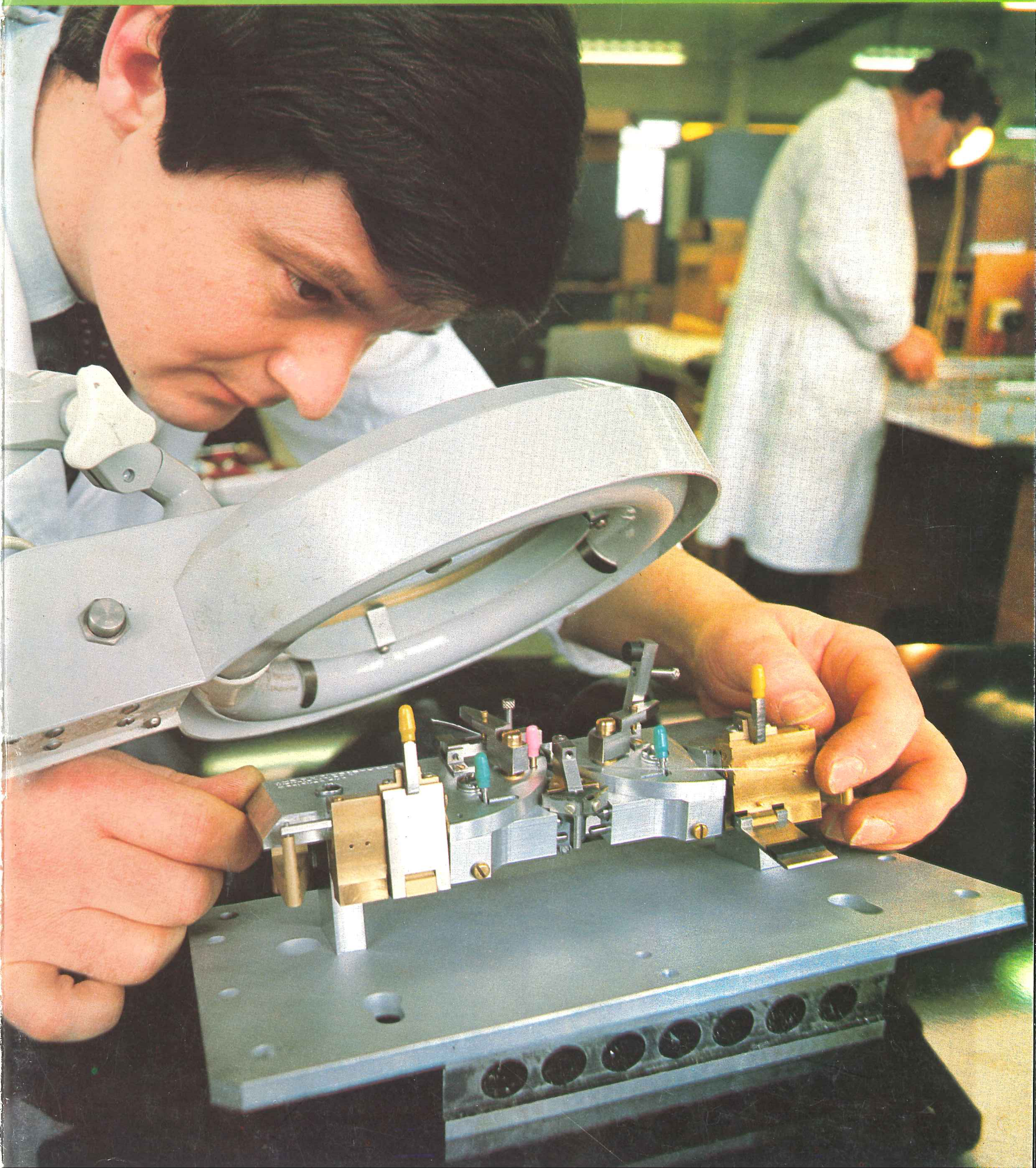


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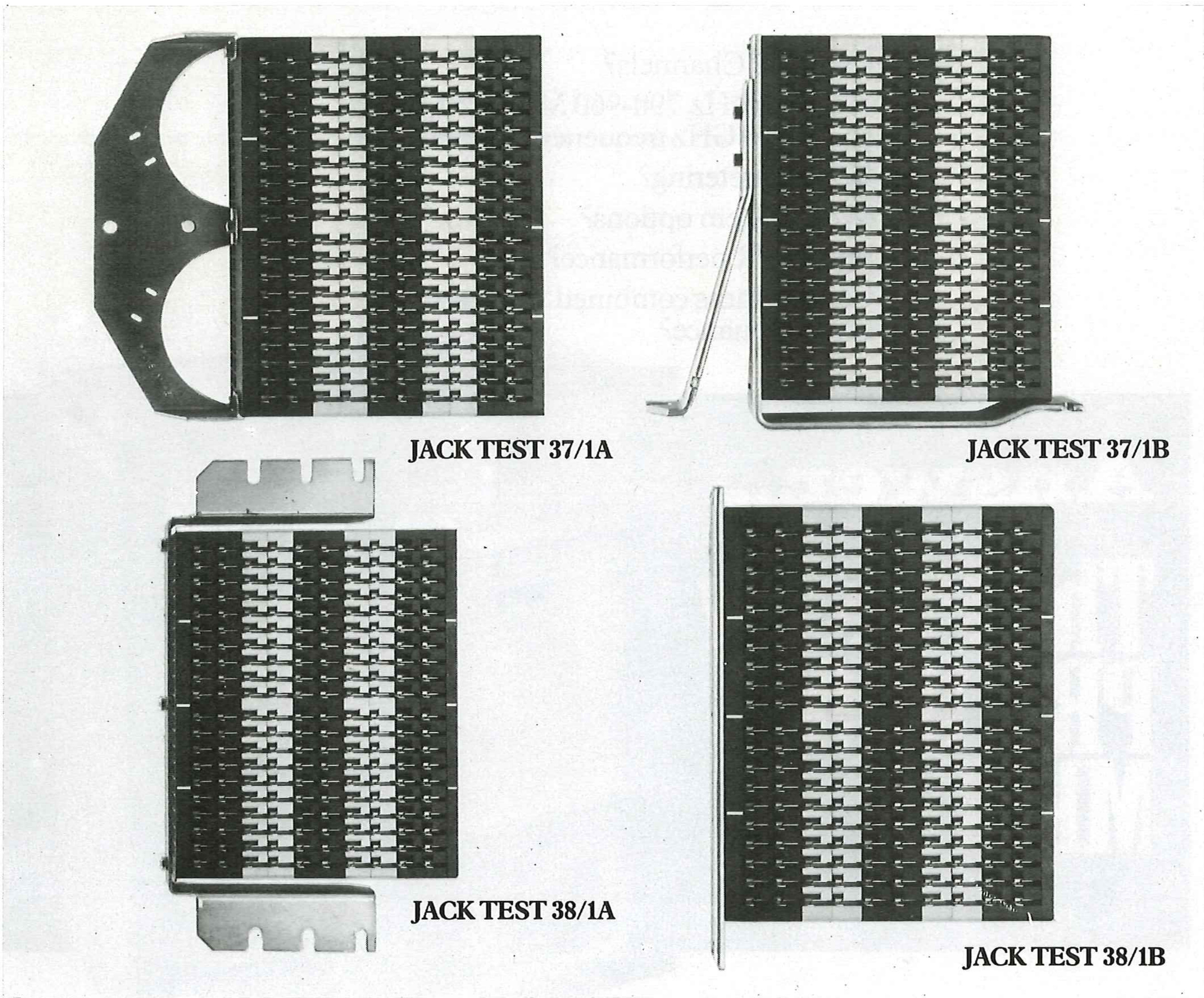

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Meeting growth at Madley

Inauguration of the new earth station at Madley near Hereford by Mr Peter Benton, Managing Director, Telecommunications, is a further major advance in the Post Office's commitment to meet the continuing dramatic growth in international telephone, telex, data and television traffic.

Currently telephone calls to and from Britain number about 12 million a month and are doubling every four to five years while telex and computer data are growing just as quickly. Intercontinental calls (to and from places beyond Europe) account for four million a month and six out of every 10 go by satellite either via the new giant Madley aerial or through the existing Post Office earth station at Goonhilly, Cornwall.

Madley, in fact, is already carrying a million calls a month between Britain and some 40 other countries via the Indian Ocean Intelsat satellite. Phone calls to some of these countries have been growing at a rate of 30 per cent a year. The calls are beamed to a satellite 22,300 miles out in space and then back to another dish aerial in the distant country taking about quarter of a second to make the round trip.

The new Madley aerial whose 32m (105ft) diameter dish is the Post Office's largest, is equipped to carry more than 2,000 telephone calls at once. This is more than twice the capacity of the Goonhilly 1 aerial which was carrying Indian Ocean satellite calls until November when Madley took over, and which has now had its beam turned back to the Atlantic.

So far the Post Office has spent about £10 million at Madley under its £1,000 million a year programme of investment in new plant needed to cater for growth and provide for new services in the future. There will be further investment in equipment for Madley during the next few years and contracts have already been placed and work started on a second aerial to come into service next year. A third will follow in 1981 and eventually it is envisaged there will be six aerials on the 140 acre site which was selected because of its freedom from radio interference, its size and its good telecommunication links with London.

Madley's introduction into service coincided with the transfer of all the Indian Ocean earth stations from an Intelsat IV satellite with 4,000 telephone circuits, to a IVA, capable of carrying 6,000 calls simultaneously. Next year will see the launch of the first of the next satellite series known as Intelsat V which will have twice the capacity of IVA. Within the next two years all the existing IVA satellites will be augmented by four Intelsat V systems – two over the Atlantic and two over the Indian Ocean.

Post Office telecommunications journal

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Cover: Technical Officer John Jones of the Post Office Research Department, Martlesham, carefully checks the alignment of an optical fibre jointing machine used for breaking and jointing optical fibres.

The Eurodata Foundation

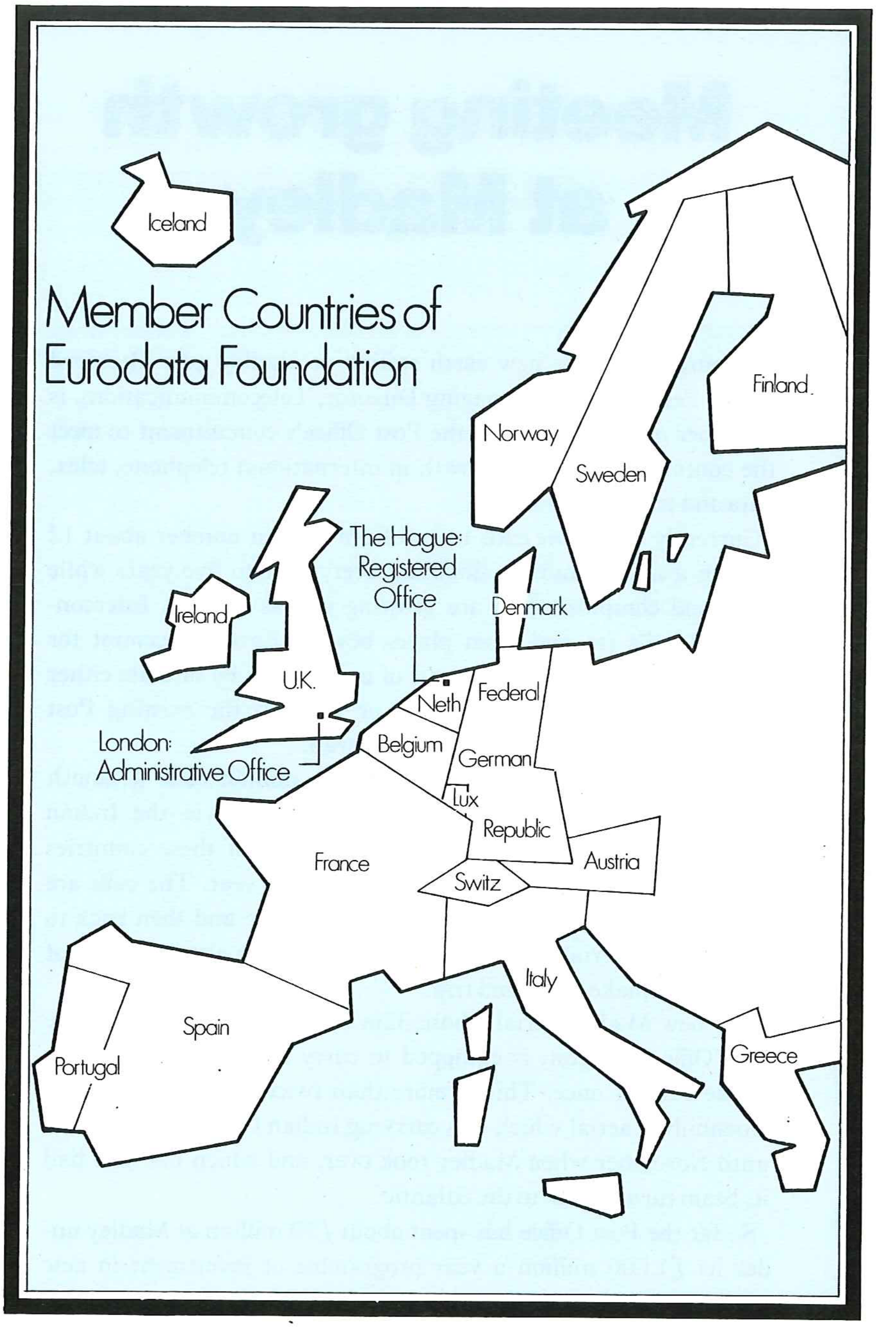
CE Drake

IN RECENT years rapid growth in the use of data communications by commerce and industry worldwide has given rise to technology of ever increasing sophistication and there is now a wide range of equipment and services available. But to meet the needs of user organisations in the most efficient manner and provide economic and reliable data communications it is vital to select from the range the most appropriate services.

The increased diversity of facilities and services has, therefore, brought a growing requirement for readily available information about them. Telecommunications Administrations (PTTs), which are largely responsible for the provision of data communications services, are aware of this requirement for information and are continually generating and providing, for the benefit of users, suitable material to meet their needs.

As part of this programme, in June 1977, 17 members of the Conference Européenne des Administrations des Postes et des Télécommunications (CEPT) decided to form an independent body to undertake joint activities on their behalf. The members were Belgium, Denmark, Federal German Republic, Finland, France, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. Last year Austria also joined in bringing the total number to 18.

The Eurodata Foundation is a legal entity created under Dutch law with its registered office in The Hague. It is controlled by a General Board, with a chairman from Italy, vice-chairman from Sweden and treasurer from the Netherlands. All are senior officials in their own administrations. The Administrative offices are based in London with Mr T. D. Brougham of Telecommunications Marketing Department employed by the Foundation as manager.



The fundamental objectives of the Foundation, acting within the fields of data communications and related telecommunications, are to conduct, control and co-ordinate studies and activities on behalf of members, to market information services, to develop and maintain a European data communications database and to act as a legal instrument for members jointly in contractual arrangements with third parties.

Currently the Foundation is actively involved in data communications market research. A major survey of national and international data communications in Europe, entitled EURODATA 79, has been commissioned on behalf of member PTTs, and the study will provide members with forecasts of European data communications user requirements until 1987. This will help PTTs plan national and international data communications services.

The study results and the associated database will also be of interest to other organisations such as data communications equipment and terminal manufacturers, consultants and users, and the Foundation intends to make available suitable information derived from the study and database as part of a commercial information service. This service should begin next year.

As well as its research activities, the Foundation at present markets two annual publications. The Eurodata Foundation Yearbook gives detailed information on current data com-

Designer Tony Smith and Christine Drake, author of this article, check through the artwork for the Eurodata Yearbook published earlier this year.

munications services provided by member country PTTs and, on behalf of CEPT, Public Data Networks which details the plans of CEPT Administrations in respect of public data network facilities.

The first edition of the Yearbook was published in April this year and contains information on data communications services and equipment provided by PTTs together with technical data and tariffs. Additional information is also provided on PTT organisation and policy, permission to attach equipment covering regulations and procedures, and PTT contact points for service and information.

PTTs have supplied a wide range of information which will be of interest to equipment suppliers, consultants, users and others involved in the current European data communications arena. The Yearbook has been compiled as a readily accessible, authoritative, comprehensive and up-to-date information source to help in the planning, implementation and use of the facilities offered by the PTTs.

In many cases, the information provided will be sufficient to enable planners and designers to define and evaluate proposed data communications facilities for their organisations without reference to other information sources. In other cases, further information will be required, and the book lists appropriate contact points where further information may be obtained.

While it is not the intention of the PTTs that the Yearbook should replace the information brochures, booklets and services currently provided, it is seen as an important and useful complement to such information sources.

Public Data Networks is a co-operative venture with CEPT and is the second edition of a survey which outlines the plans for future networks and services in the field of data communications of thirteen Telecommunications Administrations within CEPT.

The survey indicates that there could be in Europe, by 1982, more than 80,000 digital data terminals of all kinds, made up of more than 55,000 terminals on circuit-switched services, and nearly 30,000 on packet-switched networks. Twelve countries have, or are planning, circuit-switched services by 1982 and the remaining country intends to introduce such a service later. Eleven of the thirteen have plans for packet-switching. Information is also included on message-switched networks or sub-networks and of private leased circuits employing digital data transmission.

The survey is of great value for planning by the computer-using and the computing industries involved in data transmission in Western Europe. It will enable datacom users to coordinate their own systems and plans with those offered by the PTTs.

A third edition of the survey will be published in September this year.

Miss C. E. Drake is an Information Officer in Telecommunications Marketing Department seconded to the Eurodata Foundation where she is responsible for all public affairs.

PO Telecommunications Journal, Spring 1979

The Customer Digital Switching System No 1 (CDSS1), fulfills the need for a modern, compact small PABX.

Looking after other people's business

F Lawson

This is the first of two articles from Telecommunications Marketing Department about the wide range of new telecommunications products and services which have recently become or soon will be available. This one deals with how they affect the business sector and the second will be concerned with the residential market.

THE NEXT FEW years will see significant improvements in the provision of telecommunications products and services for the Business Sector but developments will embrace far more than just the supply of new equipment and facilities. Basically the Post Office is changing its whole approach in a determined bid to meet adequately the needs of business.

The aim is to provide wider choice of equipment with updating and rationalisation of the present product range; equipment, services and facilities based on more sophisticated technology; greater emphasis on identifying and meeting the needs of various sections of the business market and speedier provision of existing and new equipment, services and facilities. It is also hoped to innovate more successfully, adopt a more direct and continuing dialogue with business customers and their representatives and

An important new switchboard development is the Premiere Call Connect System now available nationwide.

The TD Callmaker one of the new repertory diallers due for introduction throughout 1979.

improve publicity emphasising what is being done and what might be possible in the future.

The first step is to identify needs. Of course, traditional market research has always been carried out and this will continue. But the main emphasis now is on a programme of in-depth market segmentation studies. One has already been completed on the hotel trade, others have started or are about to start on the travel, tourist and agricultural industries while several more for other sectors are in the planning stages.

These studies look at the immediate, medium-term and long-term needs and how far Post Office Telecommunications can, or could, meet them. The study is followed by a presentation to the trade association or representatives of the industry, preparation of sales packages and briefing of Regional and Area sales staff.

Findings are supplemented by detailed studies of products, compiled in the form of Product Fact Books, which further analyse market sectors and performances. These help Product Group Managers in THQ Marketing Department such as the Audio Products Manager, the Mobile and Visual Services Manager, and the Telex and Facsimile Services Manager, to plan and develop their strategies and also to monitor them with a computer-based Sales and Installation Plan. This work is being undertaken in close co-operation with Regions and Areas.

Having identified the needs then the aim is to meet them. To do this the Telecommunications Business is in the process of updating and extending its range of products and services. Very high priority is attached to this objective. Over a period of 12 months more than 25 new products will be introduced but in an article of this length it is not possible to look at more than a selection of them.

One of the most important developments in the switchboard field has been national introduction of the Premiere Call Connect System. Technological development has blurred the boundaries between PABXs and PMBXs – hence, the new term: "Call Connect System." The Premiere, for example, offers automatic clearing of calls and has optional direct outward dialling for selected extensions. It also looks modern with push-button operation and a very compact equipment cabinet. The design allows modular growth up to a maximum of 10 lines and 48 extensions and it is believed that this new system will prove very attractive to a wide range of customers.

Looking a little further into the future, there is the introduction from next year of a new processor-controlled system – the Customer's Digital Switching System (CDSS1) (see Telecommunications Journal, Spring 1978) which uses single channel codecs and pulse code modulation techniques for transmission of speech. Microprocessors control calls and facilities. The system is of modular design, with solid-state devices. It is modern, quiet and very compact.

Introduction of the CDSS1 will represent a major step forward, bringing a wide range of new facilities to this vital part of the market. In the same timescale, a small Business System to complement the CDSS1 at the lower end of the scale is also being developed, modernising the present range and offering a number of new facilities. In both the business and residential sectors the Post Office is at the beginning of the push-button era, with almost 400,000 push-button telephones being rented at present. Push-button calling is available on a number of models, and the stylish push button trimphone is already very popular with customers.

But besides telephones, there is a large variety of associated equipment in the course of introduction. One new favourite for any office is the Xpress Callmaker. This combines the advantages of push-button calling with a ten-number memory and a "repeat-last-call" facility. With these extra features, the Xpress should be a great success in both business and residential markets.

Other new repertory diallers include the XL Callmaker, with its 48-number capacity; the Mono – a single-number

callmaker with important specialist uses and the TD Callmaker – an up-market electronic device for business use. These callmakers will be progressively introduced during 1979.

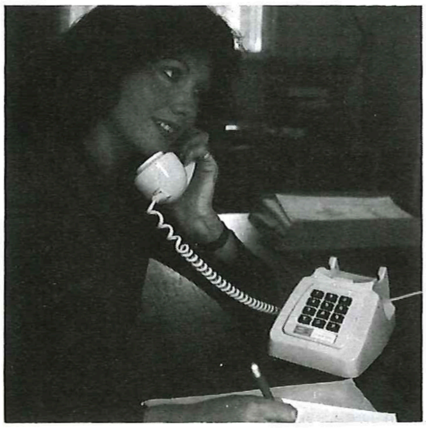
Another improved addition is the Auralite – an ultra lightweight headset which can be worn for long periods without discomfort and does not interfere with hairstyles. New equipment is also planned in the range of Answering and Recording Machines, and later this year it is hoped to extend the use of the "Doric", now on market trial in Leicester. This is a relatively inexpensive add-on loudspeaker system, already proving very popular.

But it is not only in telephony where change is taking place. The potential of the telex service is being increasingly recognised and is soon to enter a new phase of life. It is moving towards new products, technology and facilities. No longer is it simply a case of providing telex connections and terminals on a one-to-one basis. Already there has been a convergence of telex and private networks with the advent of message switchers, while the new version of a telex private exchange and other major new developments are also possible.

And let us not forget Facsimile. It has, of course, been around for a long time but in the last few years the nature of its technology has changed substantially. With the move towards international standards of compatibility, the potential market and the pace of development are likely to expand considerably. The Post Office is set to test the market by trying out two different types of machine and will decide its strategy by the middle of this year. It is to be hoped that Facsimile will then take its rightful place in the mix of telecommunications services and facilities, and in the next five years significant developments can be confidently expected both in this country and the rest of the world.

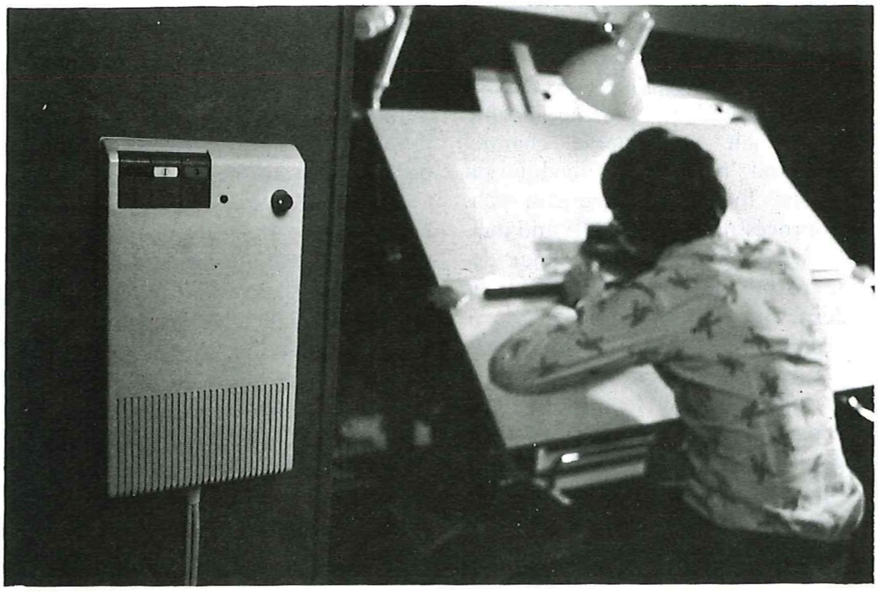
There is further potential, too, in those services which can be generally called "conferencing". The Post Office were early leaders in this field with Confravision and have lately supplemented its fixed studio service with the provision of mobile facilities. A Viewphone model at a recent exhibition aroused great interest and possibly there are a number of other visual services which now require deeper consideration. Audio conferencing is not forgotten either and a useful system called ORATOR has recently been previewed.

As energy and resources conservation become even more important, so the scope for use of mobile services will increase. The Post Office Radiophone service has been extended to the major cities and areas in this country and consideration is already being given to changes in method of operation and technology which will further improve it and help to overcome the London problem of a shortage of spectrum.



The X-Press Callmaker, a combination of push-button phone and 10 number memory.

The 'Doric' add-on loudspeaking system currently on market trial in Leicester, gives freedom to use both hands, move about and include all the family in phone calls.



Radiopagers or "bleepers" are a new line of business. They first appeared in the Thames Valley, built up to about 20,000 pagers in the first phase of growth in London and it is now planned to extend to Birmingham, and other cities in the shortest possible timescale.

There is also the development of Alarms By Carrier (ABC) the system which enables an alarm signal from a customer's premises to be transmitted over a normal telephone line at above audio frequencies to a special terminal at, say, the local police station. (see Telecommunications Journal, Autumn 1978). "Service 800" the new service which allows UK telephone users to call selected overseas firms by simply dialling a London number, was launched at the end of last year, and other major growth areas include the expanding Prestel, Data and international services.

But still more must be done to let customers know about the range of products, services and facilities available. The sales force is the spearhead here and the aim at THQ is to brief them more quickly on new developments. "Telecomms" magazine goes to nearly 300,000 businesses and Marketing Department can and does produce special editions dealing with specific sectors. There is the annual Buzby train which enables the Telecommunications Business to centre on local displays and take part in major national and international exhibitions.

There are consultants who advise on networks and experiments have started in "Phone-Power" – a planned programme for exploiting use of telecommunications resources to achieve commercial business objectives, an approach used extensively in North America. There are seminars to organise, and take part in and over the next few years the Telecommunications Business will devote more and more effort to meeting the needs of the different sectors of the market and improving market techniques.

Mr F. Lawson is Deputy Director of Telecommunications Marketing Department, responsible for Marketing, Sales and Installation, Publicity, Inland Forecasting and Tariffs, and Data Communications and Design.

Cliff Stapleton, a Technician at St Botolphs, checks the status on the central processor.

International telex by computer

G Scott

THE RECENT opening of its first Stored Program Control (SPC) international telex gateway exchange at St Botolphs House, London, is a major step forward in the Post Office's commitment to strengthening its communications facilities worldwide. The new exchange is the third international telex gateway, but the other two, also in London, are Strowger exchanges which, until St Botolphs SPC became operational, had been carrying all the traffic to and from international destinations. These gateway exchanges provide the interface between the international routes and the inland telex exchanges.

Stored Program Control telex exchanges have, in fact, been in service in other countries since the 1960s. Telegraph signals are already in digital form and with the advent of computer technology it became a logical step forward to adopt stored program control techniques for telex switching. The St Botolphs exchange is a Plessey 4660/70 system providing an initial capacity of almost 5,000 terminations (lines) with a capability to extend to 7,500 terminations.

The operation of the exchange is complex, with the heart of the system being a computer based Central Processing Unit (CPU), operating to instructions provided by software programs. Unlike the Strowger exchange, there is no physical connection between lines and circuit switching is performed in time division multiplex (TDM) mode.

Four terminators are housed on a printed circuit card and four cards are grouped to constitute a terminator group. Sixteen of these terminator groups comprise a terminator cabinet of 256 terminations. A maximum of 16 terminator cabinets can be grouped to form a sub-system with a total of 4,096 terminations. The maximum size of the Plessey 4660/70 exchange is eight sub-systems giving 32,768 terminations.

Each terminator cabinet contains two Terminator Cabinet Controllers (TCCs), which are duplicated interfacing equipment controlling data transfer between the computer and the terminator groups. The 16 terminator groups within the terminator cabinet each contain a Terminator Group Controller (TGC) – an electronic module which connects directly to 16 terminators. The paths to the CPU are duplicated and failure in one TCC will not cause failure of the 256 terminators. In this system dual redundancy of control is maintained down to 16 terminators.

The heart of each sub-system is the common control (CPU) which incorporates the central processor. The common control is duplicated with one side operating on-line and the other as hot standby. The computer in the CPU has a core storage area of up to 128K 16 bit words. Areas of core are designated for particular functions, which include call registers, information tables containing details of every terminator in the system and programs used to run the system.

St Botolphs exchange has three sub-systems, although only two are used for telex switching. When two or more sub-systems are provided, it is necessary in order to achieve full flexibility, for the exchange to be able to interconnect lines between sub-systems. In the 4660/70 system this interconnection is performed by a high speed data highway or BUS. The BUS consists of transmission paths interconnecting all sub-systems.

When a call enters the exchange on one sub-system and leaves on another, data is transferred between sub-systems at high speed over this BUS. Each sub-system is thus able to receive or transmit information to any other sub-system. The BUS is not only used to carry message traffic but it is also used by the CPU in the setting up and the clearing down of calls. Test messages are being continuously looped around the BUS to check that continuity is maintained.

The operation of this complex

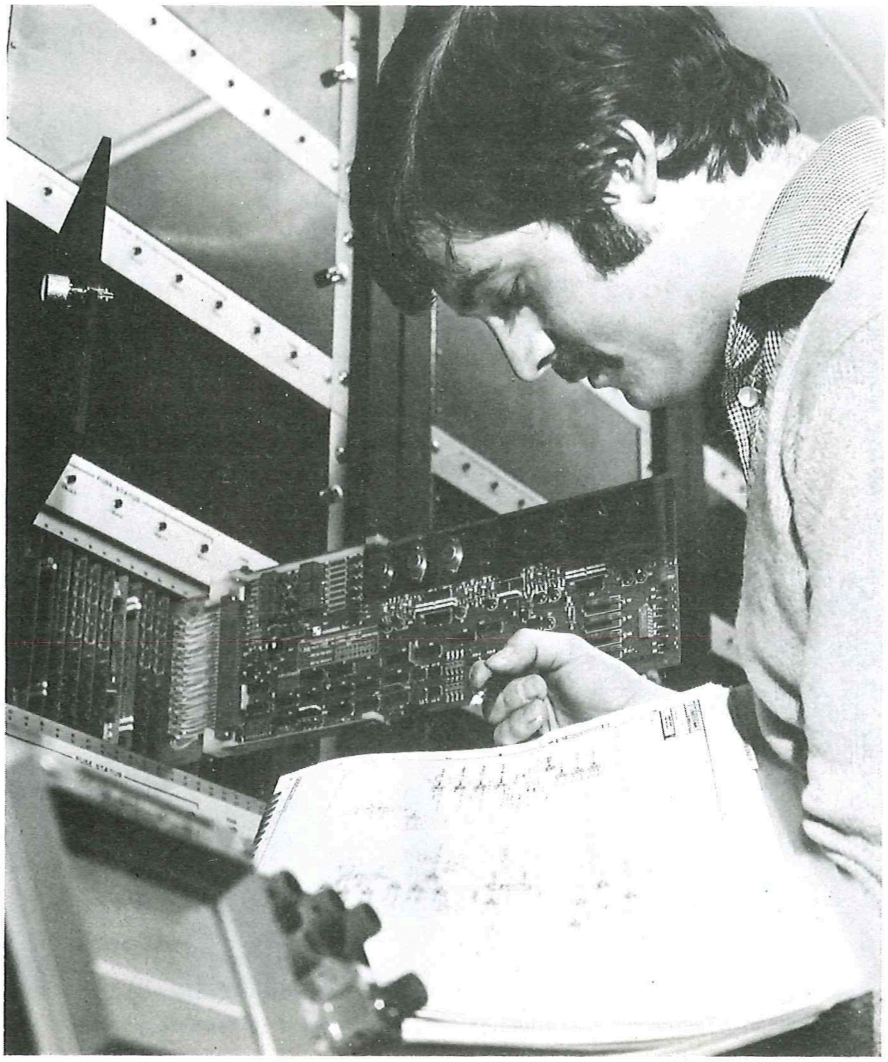
switching system is controlled by software programs which are stored in the computer memory. Programs are written to cover every function of the exchange. The many different signalling protocols encountered on international routes each have separate programs, as do the instructions to control facilities for accounting and statistics and the many internal functions necessary to run and control the exchange.

Any change in the system operation requires modification to an existing program. Although no customers are directly connected to St Botolphs, it is necessary to provide accounting information for intercontinental call billing and international accounts for apportioning of revenue on international routes. For every call that is accepted by the exchange an area of core store is allocated to the call and details of the call are temporarily filed in the core. Call record information varies slightly between intercontinental calls which require more precise information for customer billing and continental calls which are recorded only for international route accounting. Customer charging for continental calls is by meter pulsing on the customer's meter in his local exchange.

The call record includes details of the calling customer's answer back (intercontinental calls only), the time the call was set up, the called party's number, the time the call was completed, duration of the call and special information about the call. Information on ineffective calls is also recorded and reasons for call failure are included on the record.

On completion of a call, either effective or ineffective, the record information in the form of binary characters is transferred from the memory store into a small buffer store which assembles 30–40 call records before transferring them in blocks on to magnetic tapes. Each sub-system has its own accounting tapes and a call using both sub-systems will be recorded on the tape of the sub-system initiating the call. For security reasons tapes are duplicated and should the on-line side of a CPU fail, the standby side, which is tracking the on-line, takes over without loss of a call or call record information.

The call record information is also used to provide comprehensive statistics on the exchange performance. Statistics such as calls accepted and rejected by the system, and route by route performance figures are printed on to specified teleprinters at half hourly intervals. These intervals can be varied by commands input to the computer. The completed accounting tapes for each sub-system are terminated at midnight, or earlier if full, and sent daily to a Post Office Data Processing Centre for the assembly of billing and accounting data and the production of additional call statistics.



Technical Officer Vince O'Toole tests a terminator card for faults.

A call incoming to the exchange will seize the line terminator connected to the circuit. This signal will be detected by the TGC which is continuously scanning the terminators. The terminator address is passed to the computer which holds in its memory information for each terminator. The computer recognises the incoming call and allocates a "Call Processing Register" (CPR). The TGC continues to sample the incoming dial pulses or teleprinter characters representing the country code and number required.

Each bit of the $7\frac{1}{2}$ bit teleprinter character is sampled 16 times, and the bit is stored by the TGC until a complete character is received. This information is then passed to the allocated CPR which assembles characters forming the routine code. When a complete selection has been received the CPU determines the outgoing route and selects a free circuit either in its own sub-system or another via the BUS, and then forwards the remainder of the call selection.

When the called party answers, the CPU in its memory couples the incoming and outgoing terminators, notes the time of connection and stores the call information. While the call is in progress a separate part of the CPU monitors the call and passes characters between the terminators. This process represents an important aspect of the 4660/70 system, since it frees the computer to supervise further call set-ups, to clear and to perform other program functions. The computer is thus unaffected by the volume of calls connected on the exchange.

At the termination of the call, the computer is reaccessed, and records the time the call finished. It releases the terminators in its memory and transfers from its CPR the call record information into the accounting record buffer store and subsequently

on to the accounting magnetic tape. During the progress of the call, teleprinter signals have been sampled at high speed, stored, assembled into characters and then passed between incoming and outgoing terminators under the control of the CPU which is being directed by the software programs. No physical path between terminators has been established throughout the call progress.

At St Botolphs any type of telex trunk can be connected to any terminator, with complete flexibility on the allocation of trunks across the exchange. The exchange is provided with sufficient trunks to meet the busy hour load and with the flexibility of the system there is no need to provide capacity to meet route or switch block busy hour traffic levels.

The exchange can deal with 10 call attempts per second on each sub-system, and the exchange capacity is related to the processor handling capability. Since the main processor is not involved when a call is in progress, but is involved in call setting up, the equipment will not accept for setting up more attempts than its processor can subsequently handle. Calls arriving in excess of its capability will be rejected. There is no form of call queuing.

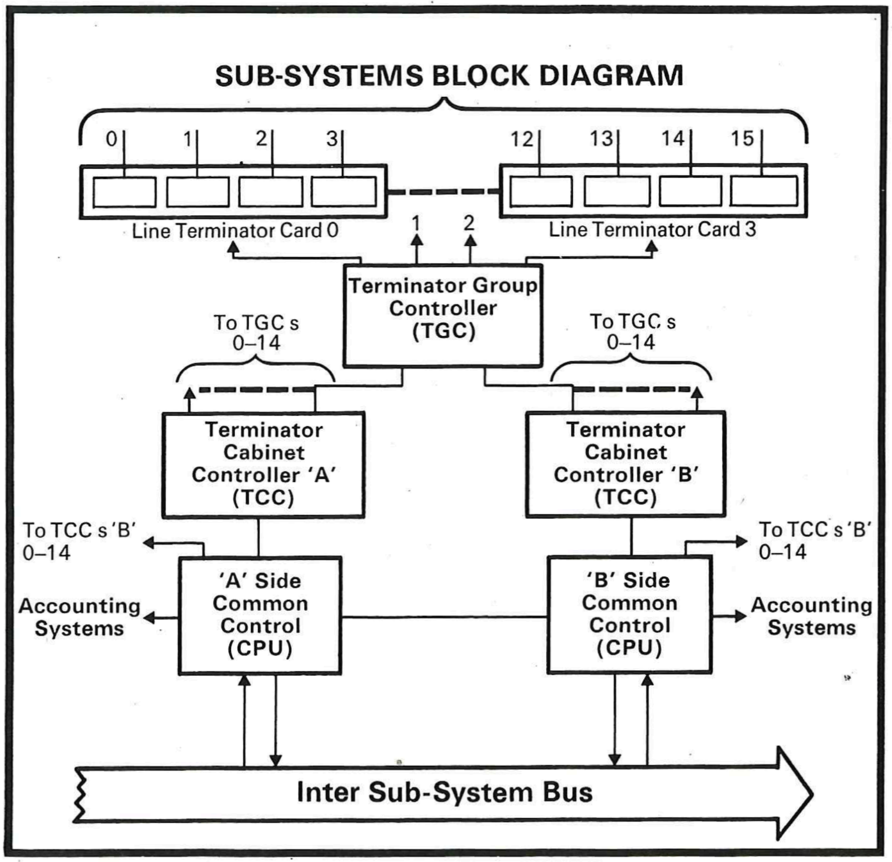
The third sub-system of the St Botolphs unit is being programmed to provide facilities for the connection of lines operating at speeds of 110, 200 or 300 bits per second. It is possible that customer demand may arise for the operation of telegraph or low speed communication at speeds in excess of the 50 baud telex rate. SPC exchanges are ideally suited to switch data at higher rates and telecommunications organisations throughout the world are combining a higher speed capability with their new telex SPC exchanges.

With the capability built into St Botolphs the Post Office will be in a position to operate at higher speeds should the need arise. The third sub-system will also provide an automatic multi-address capability which will replace the existing manual multelex service.

Some of the advantages of SPC switching are its complete flexibility in the allocation of terminators to circuits, its economies in provision as processor capacity is provided to meet the exchange busy hour load and not combined group busy hours. There is also the fact that comprehensive accounting and statistics are available and there is its capability to support new networks operating at higher speeds than telex.

The floor space required for SPC equipment is considerably less than that used for equivalent Strowger switching. The SPC system has comprehensive diagnostic and self checking programs which, coupled with the absence of moving parts, considerably reduces the engineering maintenance and also adds to service reliability. New facilities are also being provided by SPC exchanges, including the Store and Forward of messages, where callers put the message into a store area of the system and then clear leaving the unit to complete the connection and forward the stored message. Abbreviated Dialling, presentation of Chargeable Duration of Call on Disconnect and Automatic Re-attempt when the initial attempt has failed, are further facilities.

An accounting tape on one of the sub-systems at St Botolphs is changed by Technical Officer Gareth Griffiths.



Although the floor area required for SPC is much less than for Strowger, higher costs are involved in the preparation of the accommodation. The computer type equipment requires false floors, refrigeration and air handling equipment and more sophisticated power equipment. Overall, however, there are clear economical as well as service advantages in providing SPC switching.

St Botolphs SPC will be followed by a new and larger gateway to be provided at Keybridge House, London, in 1981. This exchange will again be a Plessey 4660 system but it will incorporate new and improved technology and provide even more facilities most of which cannot be made available with existing Strowger based equipment.

For the future, new communication systems are being developed which eventually must have repercussions on the growth of international telex. Despite these competing services however, the popularity of telex and its world wide coverage should ensure a strong growth for the service throughout the 1980s.

Mr G. Scott is a Head of Group in ETE system and exchange planning responsible for telex and non-voice network services and facilities.

Breaking new ground

M D P Williams

Instructor/Engineer Charles Baxter of Bletchley RTC demonstrates the backhoe type excavator at the front of the Ditchwitch.

The Post Office is currently evaluating two new types of machine to help with the laying of underground cable and duct. One, a multipurpose trenching, excavating and cable ploughing unit is described here while the other, a self propelled machine which bores through the ground pulling cable or plastic duct behind it, will be featured in a future issue.

ALTHOUGH telephone penetration is steadily increasing in rural areas, the fact that houses and farms are often widely scattered means that telephone lines from the exchange to the customer tend to be long and of small capacity. Traditionally, customers in these areas have been provided with service via overhead wires or cables on strategically placed poles.

The cost of maintaining these overhead lines, however, is usually higher than that for an equivalent underground system, and the cost of laying a cable directly in the ground is less than the cost of an overhead system on new poles. For these reasons, together with the wish to keep the countryside as unspoiled as possible the Post Office buries as many of its cables as it can.

Currently cables, or the plastic ducts containing the cables, are buried directly into the ground by a single-

bladed moleplough which was developed many years ago from the moledrainers used by farmers to cut drainage slits in their fields. These ploughs are pulled through the ground by a powerful winch attached to an agricultural type of tractor, while the cable is fed into the ground via a tube at the rear of the plough blade.

This method of moleploughing is slow – an average of 40 metres or less per hour is typical – as the length of rope available on the winch is limited to about 70 metres or so and the tractor then has to be moved to a new position. In addition, any excavations required, have to be dug manually as the tractor is not equipped for digging. The tractor and moleplough can, in fact, generally lay only a single cable duct or cable.

It became apparent, therefore, that a method of moleploughing continuously was needed. This led to experiments with single-bladed moleploughs directly coupled to tractors but these were not very successful as even with a very large four-wheel drive tractor, it was difficult to obtain sufficient grip between the tractor wheels and the ground to be able to pull the plough through the ground.

At about this time vibrating cable ploughs were becoming more commonly used in the United States and information on them suggested that their use could reduce dramatically the force required to pull them through the ground. A trenching machine fitted with a vibratory plough was bought for evaluation and having proved highly successful, it was decided to buy more machines for a wider field trial which would establish the viability of the machine from both technical and organisational aspects.

These machines, known as Trench Excavators No 4, are currently being evaluated under the Engineering Changes of Practices Committee No 1. Two versions, both manufactured in the USA are being tested. One is the Ditchwitch R40 and the other the Vermeer M440. Both have a four-wheel drive tractor unit on to which are mounted various attachments.

At the back are an offset chain-type excavator fitted with spoil removal augers and a vibratory moleplough to lay cable or plastic duct. On the front are a backhoe-type excavator, a backfill blade and in the case of the Vermeer machine, a cable drum carrier. Both tractors have engines developing about 50 horsepower which provide power either mechanically or hydraulically to the roadwheels and as

Cable is fed into the plough shoot of the Ditchwitch . . .

. . . and then moleploughing the cable in can start.

required to the various attachments. The machines can be driven on the road at up to 12 mph using the conventional four-speed plus reverse gearbox.

When in use off the road a hydraulic drive system is substituted to give the slow finely-controlled speed necessary for trenching or ploughing, while the gearbox is used to transmit power to the digging chain or to the vibratory plough. Limited slip differentials and high flotation balloon tyres allow the machines to work in soft conditions without slipping or becoming bogged down. Windscreens and a roof incorporated in the roll-over protection frame protect the operator from the worst of the elements.

The chain type excavator consists of an endless roller chain fitted with digging teeth, which is supported by the digging boom. The digging boom is lowered to the appropriate digging depth – the maximum is one metre – hydraulically but the digging chain is driven mechanically via the gearbox so that its speed can be varied by changing gear to accommodate varying soil conditions. Two digging chains are supplied with each machine to enable trenches of either 150 mm (6 inches) or 255 mm (10 inches) wide to be dug.

Because the digging boom is offset to the right side of the machine, trenches can be dug close to obstructions and the power of the machine is such that trenches can be excavated at a rate of up to 500 metres per hour under good conditions. This part of the machine is used to dig trenches into which are laid ducts to contain telephone cables.

The chain type excavator at the back of the machine removes spoil prior to cable being laid in.

The vibratory plough, driven mechanically via the gearbox, is new to the Post Office although prototypes have been previously investigated. The plough blade is vibrated vertically at a frequency of 500 to 900 cycles per minute causing the blade to move up and down and saw its way through the ground. The vibration dramatically lowers the force needed to pull the blade through the ground, and also enables the plough to cut through tree roots and to penetrate rocky soil more easily without riding out of the ground.

At present the machines are equipped to plough in only cable at a fixed depth of 610 mm (24 inches) but alternative blades are available from the manufacturers for other depths. Experiments have been tried which show that it is possible to plough in a single-way 4 inch plastic duct using a special plough blade and it is intended to experiment with burying two ducts in the near future. The fact that the plough blade is centrally mounted is a limitation and means that obstructions must be at least one metre away from the ploughing line. To obtain offset working of the plough, however, would require a much larger and more expensive machine. In difficult situations the problem can usually be overcome by using the offset chain trencher to dig a trench over the section involved.

The backhoe fitted with a 305 mm (12 inch) wide bucket is useful for digging holes for joint-boxes, for digging starting pits for moleploughing and for short runs of trenching. The backfill blade takes most of the hard work out of backfilling trenches, and although it is not a bulldozer, it can be used to clear undergrowth and other obstructions in preparation for using the other attachments. A cable drum carrier can be fitted to the backfill blade of the Vermeer machine which allows the cable to be fed via guides from the drum to the cable chute which is situated on the plough blade.

This saves the chore of running out the cable before ploughing begins and all future machines will incorporate this facility. Reports from Telephone Areas using these machines have been generally very encouraging, although some Areas where conditions are difficult feel that they need an even more powerful machine.

The new machines take most of the hard physical work out of duct laying and moleploughing of cable and enable jobs to be completed more economically than previously. They open up the possibility of a new era of direct labour underground line construction which will enable Areas to undertake such work at short notice, when required, for instance, to meet customers' installation needs.

Mr M. D. P. Williams is an Executive Engineer in the External Plant Development Division of THQ Operational Programming Department responsible for design and development of vehicular mechanical aids.

PO Telecommunications Journal, Spring 1979.

Help for the customer

KP Szlichcinski

A volunteer takes part in an experiment run by Human Factors Division to evaluate a set of pictorial instructions.

POST OFFICE Telecommunications services and equipment need to be provided in such a way that potential customers can learn easily how to use them. Ideally, new equipment should be designed so that anyone using it for the first time can see how it works.

Unfortunately it would often be prohibitively expensive to design new systems in this way, and there are at present many types of equipment and facilities whose operating procedures are not immediately obvious. The conventional way of helping customers to use systems whose operation is not obvious, whether they are public coinbox telephones or complex PABXs, is to provide a set of instructions when the equipment is supplied.

The problem of educating customers to use unfamiliar equipment or facilities is becoming more acute because of the wider selection of products and services offered by the Post Office and the increasing range of customers – those visiting this country from abroad, for example – who make use of them. The importance of enabling new customers to use Post Office services successfully is, however, frequently forgotten in the excitement of designing new systems and as a result of familiarity with old ones.

The evidence suggests that, at least in the past, there has been room for improvement in the instructions the Telecommunications Business has provided for its customers. Surveys and laboratory studies have shown that people who refer to the instructions in a telephone kiosk are more likely to make a mistake in operating the telephone than those who do not consult them. Of course, this finding is partly artificial in that it is the people who are not sure of what to do and therefore likely to make a mistake anyway, who refer to the instructions. It does suggest, however, that there is scope for improvement in the compilation of the instructions themselves.

Four years ago, the Human Factors Group at the Post Office Research Department participated in an international study to find out what difficulties customers encountered when making international calls. Only six out of a sample of 32 residential customers managed to use the instructions in the 1973 Dialling Instructions Booklet to dial an international call correctly first time; the rest were misled by some aspect of the instructions. Not surprisingly, in the light of these results, the instructions have since been amended.

The importance of adequate instructions is still, not taken seriously enough in some quarters, but to meet the increasing need for guidance on the preparation of customer instructions, Human Factors Division have acquired the expertise to advise on instructional problems and have gained considerable practical experience in arriving at satisfactory solutions.

Theoretical principles and common sense alone do not guarantee production of good instructions, because every situation where the need for instructions arises poses its own unique problems and offers new opportunities for confusion. Observation and experiment are of prime importance in testing the effectiveness of instructions, and this involves finding out what improvements should be made and comparing alternative revised versions with each other and with the original.

The Human Factors approach is probably best demonstrated by a few examples. The instructions for using public call-boxes have received most attention because of their high usage

by foreign visitors and other people not familiar with the British telephone system. In parallel with the studies of the current instructions already mentioned pictorial coinbox instructions of several different kinds have been evaluated by asking people to make calls from standard coinboxes and ones with modified operating procedures, and observing the number and nature of mistakes made.

Pictorial alternatives to the written descriptions of tones which many people find difficult to interpret have also been tested. A pictorial notation for tones was devised by asking a sample of customers to draw their own diagrams of tones, and the comprehensibility of the diagrams occurring most frequently was tested by playing a fresh group of volunteers an unfamiliar tone and asking them to pick out the diagram which described it. It was found that drawings of simple tones were as recognisable as the equivalent written descriptions, or better, and of course they have the advantage of being understood by people unable to read English.

A more ambitious project has established the ground rules for producing comprehensible pictorial instructions. Guidelines for making written instructions as easy to understand as possible are readily available, but nothing equivalent for designers of pictorial instructions had existed. Indeed, very little evidence was available as to how widely understood pictorial instructions were. It was fair to ask whether a picture really was worth a thousand words and it was also important to discover whether the differences between the various ways of presenting pictorial instructions affect their usefulness, or whether the choice between them is simply a matter of aesthetic taste.

These questions were answered, at least in part, by an experiment run in the Sales Bureau of Colchester Telephone Area Office. A total of 1,300 customers were approached after they had finished their business at the counter and asked to operate a simple piece of electro-mechanical apparatus from one of several sets of pictorial instructions. Of the 900 people who agreed to take part, 22 per cent made at least one mistake and 10 per cent had serious difficulty.

There were marked differences between the various sets of instructions and it appeared the most helpful were those which indicated the positions of the controls on the apparatus most clearly and used devices such as colour to draw attention to the most important features of the instructions.

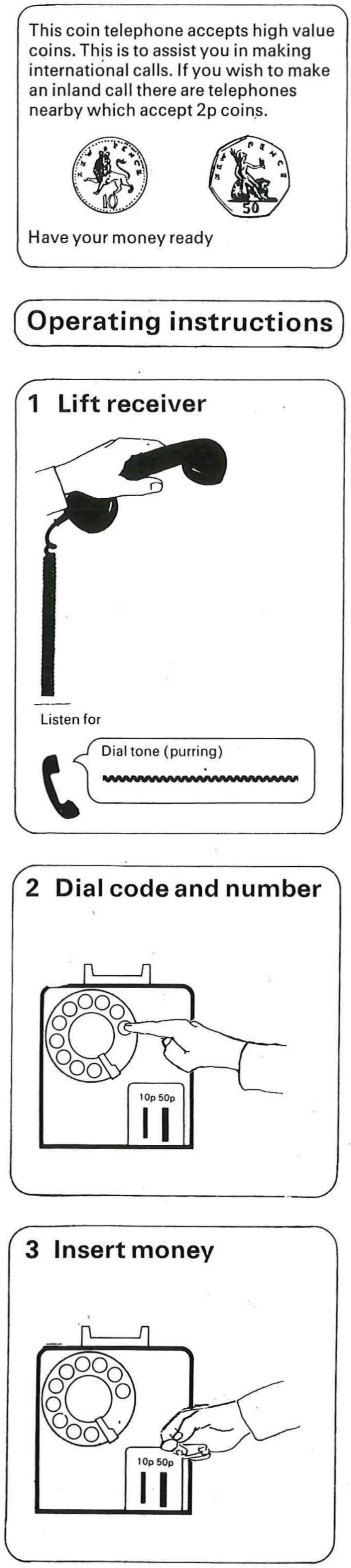
So far only the role of instructions in helping people to use existing systems has been considered. In future when the provision of new services is planned, aids to help the customer use the services can be built in as an integral part rather than added on as an afterthought.

The provision of supplementary services, such as automatic call transfer and abbreviated dialling on System X exchanges is being designed so that printed instructions complement announcements heard over the system to guide the inexperienced user. The experienced will be able to rely on the announcements alone or possibly even select an option which eliminates them. Again, the wording of the announcements is being thoroughly tested in realistic experimental conditions and in field trials.

In a short article it is possible only to give the flavour of Human Factors work on the formulating of instructions. The range of situations for which Human Factors Division have advised on instructions reflects the span of the Telecommunications Business, and includes fire alarms, new teleconferencing systems, repertory diallers, tariff information tables, loud-speaking keyphones, the CDSS1 switchboard, and aids for the handicapped. In addition some of the conclusions on the presentation of information in pictures apply equally to staff training materials.

Many seasoned engineers, will, no doubt, adopt the cynical attitude that people never read instructions. Certainly there is some truth in this because people do not automatically turn to instructions when they are having trouble operating equipment. And the chances are that if they have done so in the past they may have been put off by inadequate or incomprehensible instructions.

It is the duty of the engineer and the designer to present customer aids in such a way that they are obvious, that they attract attention, and that their design will lead the user through the operations he wants to perform. It is vital that the Business helps the customer to help himself.

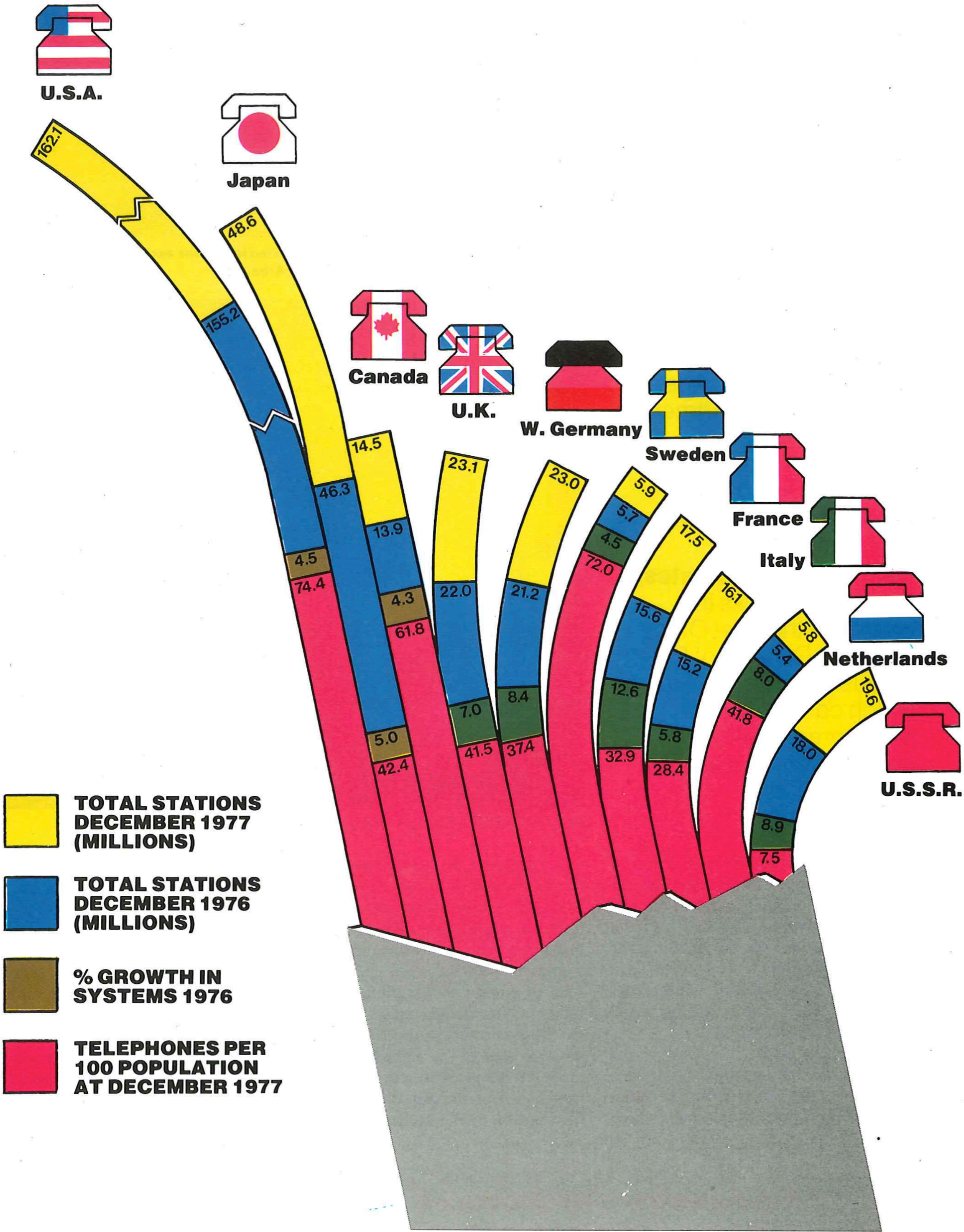


Operating instructions for the new high value coinbox were developed within Human Factors Division.

Mr K. P. Szlichcinski is a Head of Group in Long Range Intelligence Division of THQ Systems Strategy Department but was formerly an Executive Engineer in Human Factors Division, Research Department, Martlesham.

Telephones around the world

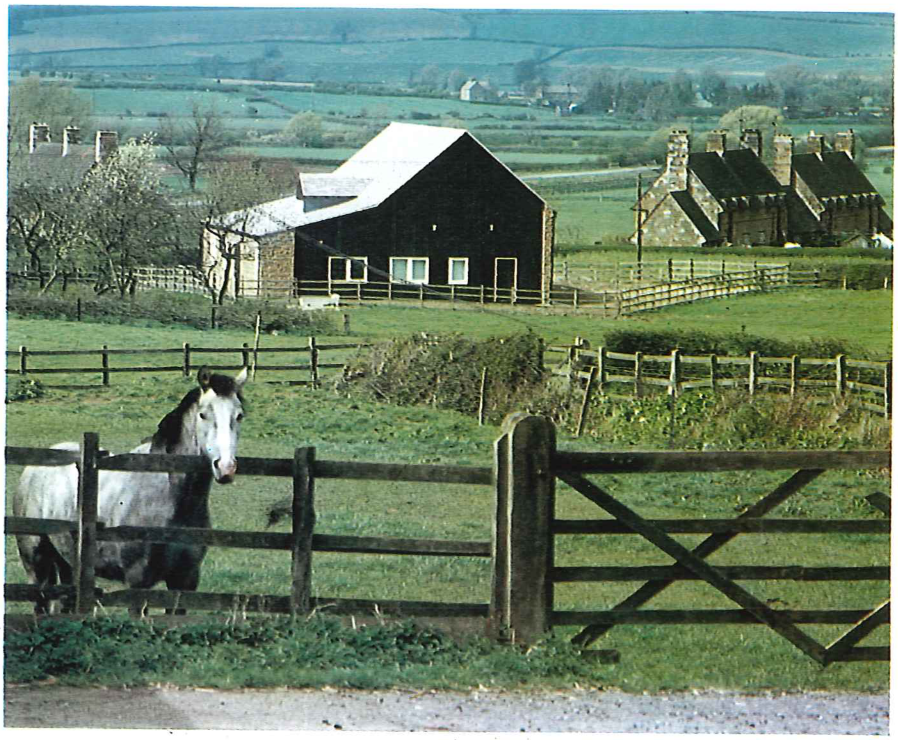
Here is our annual international comparison of telecommunications statistics. They show countries with the highest number of telephones, and include figures to indicate the percentage growth in their systems over the previous year. The source of the figures is the American Telephone and Telegraph Company.



Harmony in design

B Skeates

To meet the ever growing demands for its services, the Post Office is involved in a continuous and substantial building programme. For many years all the professional work involved, from major international switching centres like Mondial House to small automatic exchanges in country villages, was the responsibility of the Property Services Agency (PSA) of the Department of the Environment, which still undertakes the major proportion of the telecommunications programme.
Here, **Mr Basil Skeates,** Director of Works in charge of the Post Office Services Division of PSA, discusses the problems which can arise when environmental issues conflict with operational requirements.



Rockingham, Northants, where a small modified telephone exchange complements the surrounding countryside Conservation Area.

Mondial House – a distinguished architectural solution.

THE PAST FEW years have seen a major shift in attitudes towards the design of buildings. For half a century the Town Planning Acts had played a largely negative role by curbing the worst of development excesses but more recently planning authorities have had their hand strengthened with more vigorous legislation.

And now, supported by the rapid growth of amenity groups and conservation societies, they look for building, whether new or altered, which will make a positive contribution to the environment. In short, the building in its surroundings, whether it be town or country, has assumed a new and important significance in the community as a whole.

As a public corporation, the Post Office acknowledges its responsibility to the community on environmental matters. But at the same time it must make its services as cost-effective as possible. Reconciling these two conflicting objctives requires a high level of professional skill and ability on the part of the architect and the rest of the design team.

Requirements for Post Office buildings are particularly demanding. On the Telecommunications side simple, economical structures are all that are needed since many exchanges are fully automatic or require only a few staff to operate them. Site selection is often limited by the need to keep expensive cable routes as short as possible but the most economical sites are fre-

quently in heavily populated areas where harmony with existing buildings is of key importance.

Also the floor to ceiling height required for current ranges of equipment is frequently out of scale with the character of surrounding buildings and in a village or small town the telephone exchange may be one of the most prominent buildings. In large towns or cities needing larger facilities, the problems become correspondingly greater.

Local authority and community requirements can be equally onerous. The Town and Country Planning Acts give wide powers of control over the use of land and the size and appearance of individual buildings. Local authorities also have powers to designate part of towns or cities which are deemed to be of particular environmental interest as Conservation Areas.

Within these Conservation Areas, and also in areas which may be designated as being of outstanding natural beauty, a much higher degree of control over the appearance and quality of any new buildings or alteration to existing buildings, is exercised. The Post Office, like any other building owner, is subject to all these controls and obviously they have considerable impact on its building activities.

A major part of the architect's job, therefore, is concerned with the design of a building in its setting. This is not simply a matter of abstract "aesthetics" or making the exterior "pretty". It involves fundamental decisions about size and shape and materials and how the space around the building is to be treated so that the finished construction is not only satisfactory operationally, but also fits into its surroundings and, wherever possible, enhances them.

Naturally close consultation between the architect and the Post Office Operational Planning Officer and a clear understanding by them of the issues involved are essential if a successful design is to emerge. The architect will often know from his own experience what sort of building is generally required in a particular part of the country, but many local authorities have specific policies which will significantly influence design. Because of this it is vital that discussions with the local planner begin at the earliest possible stage so that his views can be considered as the design develops.

If these discussions can develop in an atmosphere of co-operation and with a common objective, the risk of abortive work and delay can be much reduced. It is not unknown, however, for planning committees, who have the final say, to overturn the advice of their own planning officers.

It is clear from all this that the design process is full of pitfalls. Nevertheless a great many buildings are designed and built, and at the peak of the Post Office's recent building programme two or three years ago, PSA was completing for the Telecommunications and Postal Businesses some 200 new buildings or major extensions every year – almost one every working day. Most of these schemes were straightforward solutions which could never pretend to be great masterpieces of design. But many did achieve the design objectives outlined above and contribute positively to the environment – some significantly so.

Take for instance a situation which arose recently at Cranbrook. Cranbrook is an old Kentish market town well known for its local architecture, and described by some as the most attractive village in the Garden of England. The Post Office's intention to build an exchange there was at first regarded with suspicion both by the local community and the planning authority.

The designer had a difficult task as the site is on rising ground at the edge of the town adjoining a Conservation Area. Part of the front of the exchange is clearly visible from the main street and the whole building can be seen from various parts of the town. Skilful design was necessary to minimise the apparent mass of the exchange and great attention was given to reflecting the local style of building and materials. It was completed in 1977 and was commended both by the Conservation Area Advisory Committee and by the local authority.

Quite a different matter was the vertical design for Tolsford Hill Radio

Cranbrook Exchange in Kent was skilfully designed to minimise the effect of its apparent mass in this attractive market town.

Chichester Telephone Exchange where an attempt to blend the sheer mass and scale of a large building into local surroundings has been undertaken.

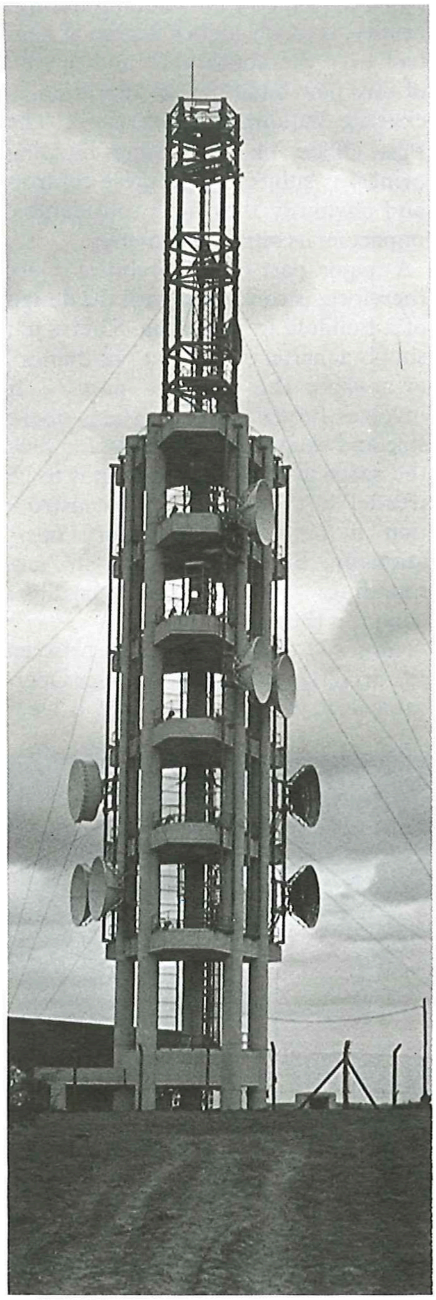
Tower, situated on a broad sweep on the South Downs overlooking the English Channel. The location was dictated by the operational requirements for a link between Britain and the European microwave network, yet the tower had to stand in the middle of an area of outstanding natural beauty.

Faced with this almost irreconcilable conflict, the tower was completed in 1975, using PSA's design for the steel and reinforced concrete structure. It was highly commended by the Royal Fine Arts Commission; won the 1975 Design Award of the Institute of Civil Engineers, a Structural Engineering Award in 1976 and a model of the scheme was exhibited in 1977 at the Royal Academy Summer Exhibition in London.

Not all designs end up as originally conceived. Mondial House, the Thames-side International Switching Centre (see Telecommunications ournal, Spring 1978) was first intended as a 15–20 storey tower block and podium. The City of London Planning Authority and the Royal Fine Art Commission were involved deeply in this development because of its prominent location. A height limit of eight storeys ensured that the dome of St Paul's Cathedral remains visible from London Bridge while the ziggurat ("step-back") design enabled the site to be developed to the maximum density for the area. It also produced an appropriately distinguished architectural solution.

At the other extreme in scale, size and location, but requiring the same careful consideration, Rockingham in Northamptonshire is an example of a standard telephone exchange design that has been developed to complement the surrounding stone farm buildings, which are part of a Conservation Area. This standard building has been considerably modified to blend in with the local architectural vernacular. The siting and setting of the building is particularly successful taking into account the quite difficult problems of access for vehicles and car parking. The cladding is in natural stone and timber doors and windows bring the final result to a harmonious conclusion.

While some designs strike an immediate chord with observers, others may need testing over a period of time. The major extension to Chichester Telephone Exchange is a case in point. Within a Conservation Area, the exchange is a major element within the City's overall development plan



Tolsford Hill Radio Tower on the Channel coast was highly commended by the Royal Fine Art Commission and winner of the 1975 Design Award from the Institute of Civil Engineers.

Llandeilo ATE, South Wales formerly St. Teilo's Church Hall.

and the designers were conscious of the need to break down the mass and scale of this large building, and inevitably environmental issues arose due to the proximity of the Cathedral.

This scheme highlights the problems of the larger urban telephone exchange where scale and bulk are extremely difficult to reconcile with the historical domestic scale of many of the surrounding buildings. Many have praised the design as accomplished and highly successful but others have criticised it as gauche and brash.

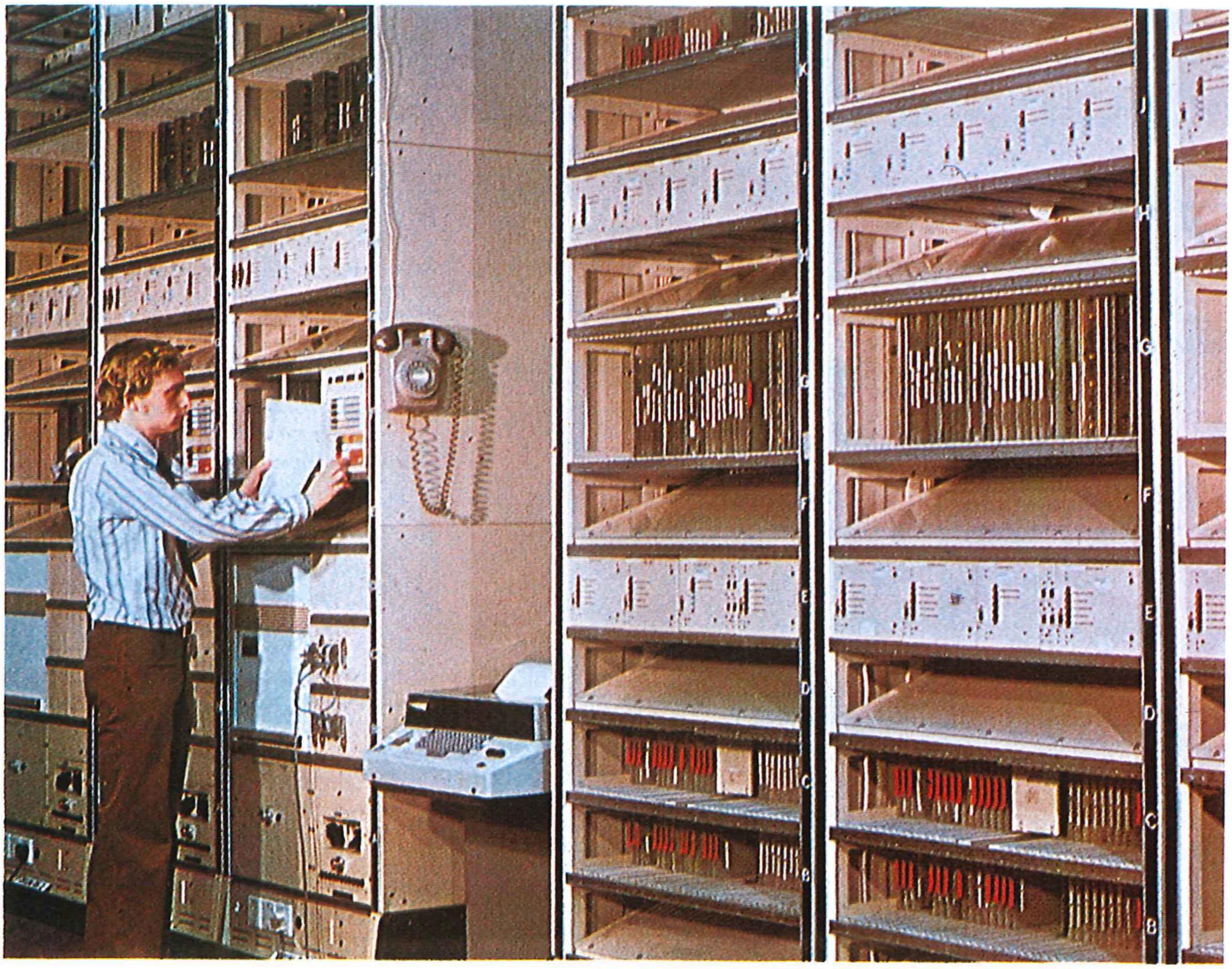
Occasionally the Post Office needs to adapt an existing building in a Conservation Area. Take the case of Llandeilo ATE in South Wales, between Brecon and Carmarthen. Owing to the lack of suitable building sites within the search area, St Teilo's Church Hall was considered for adaptation. It was the right size, and structurally suitable for alteration. Built in 1930 as a single storey building, rendered externally, and with a slate roof there were three main structural problems to overcome.

To obtain clearance for the apparatus, the floor level needed to be reduced by 300mm. Removing the Church Hall stage and proscenium arch, involved a complicated support system and insertion of a new steel roof truss, assembled in situ, on steel columns. Constructing the cable chamber meant underpinning the external walls and physical support during construction.

The whole idea was to alter the outside appearance as little as possible – and the picture (below) shows the final result. In September 1978 – 48 years after the foundation stone for the original hall was laid – the Assessment Committee for the Prince of Wales Award for Conservation met at Llandeilo ATE and decided to recommend this work which had been so successfully carried out.

There can be no doubt that it is, indeed, a complex business to design satisfactorily for the environment yet at the same time produce buildings giving the best operational results. Experience shows that the Post Office intends to discharge effectively its responsibilities for environmental conservation and enhancement; and the PSA will continue to try to realise these intentions as economically as possible without overlooking the primary need to produce a building which functions effectively throughout its period in service.

PO Telecommunications Journal, Spring 1979.



A processor to be used in the System X development undergoes commissioning tests by the manufacturer. The introduction of System X will enable alternative routing facilities to be more easily provided.

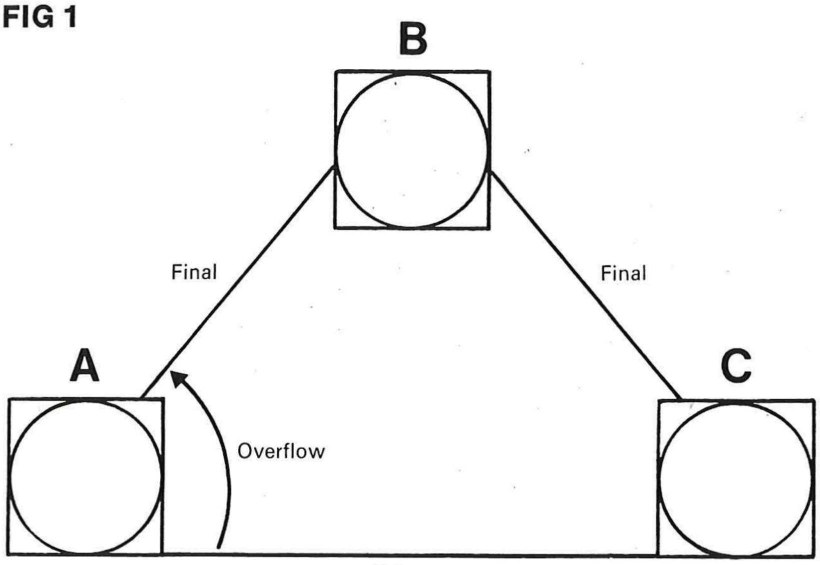
An alternative for the future?

J W Neale

BECAUSE it is uneconomical for the Post Office to provide sufficient circuits on all traffic routes between main network switching units to carry all calls offered to the network, just enough circuits are provided so that at the busiest hour of the day it is expected that only a small proportion of calls will fail because of lack of circuits. These routes are known as Fully Provided (FP), and there is no provision for the failed calls to be re-routed via paths where circuits may be free.

There is, however, another method of routing traffic, which overcomes the disadvantages of FP routes. This is Alternative Routing (AR) whereby if all the circuits on a route are engaged any further calls may overflow on to another route and reach their destination via an alternative routing (see Fig 1). The first route to which calls are

FIG 1



Automatic testing of System X boards takes place at STC's New Southgate factory.

offered is termed the primary route and the last, the final route. (There may, in fact, be intermediate routes to which the call is offered between primary and final routes but these are outside the scope of this article.) Because the primary route often carries more traffic per circuit than its fully provided equivalent it is often referred to as "high usage" working.

There are two main reasons for using AR. It can reduce costs and it can provide a greater degree of routing flexibility in the event of a breakdown or unforeseen surges of traffic causing congestion. It reduces costs by using the network more efficiently under normal conditions for the same or lower probability of a call failing through a lack of circuits.

In the present main network AR is used only to a very limited extent. Firstly it does not offer significant economical advantages and secondly the network does not generally provide the necessary technical facilities for control, transmission performance and traffic measurements that would be required for the successful operation of an AR system. It is, however, used on certain routes to and from London, the International Switching and Control Centres (ISCs and ICCs) and in the transit network (see Telecommunications Journal, Winter 1972–73). Many foreign administrations make more extensive use of AR, among them the USA (AT&T), Canada, Sweden, Japan and West Germany.

With the introduction of the main network System X exchanges in the 1980s there will be switching units which can offer fast signalling and switching with processor control and 4 wire transmission (see Telecommunications Journal, Winter 1977–78). These facilities, coupled with digital transmission, will overcome the limitations of the existing network and will enable AR facilities to be provided more easily.

Additionally the Digital Main Network Switching Unit (DMNSU) will terminate 2 Mbit/s digital streams. In telephony terms this means the termination of 30 rather than individual circuits as in existing systems. In the new network employing both digital switching and transmission there will be little difference between the cost of providing, say, 31 circuits and 60 circuits between two switching units whereas there will be a bigger difference between the cost of providing 60 and 61 circuits.

Studies have shown that because of this big cost difference (taking the network as a whole) it is economically desirable to provide circuits in modular steps with excess traffic overflowing on to a final route until the provision of an additional module is justified. For example, at present when a total of just over 30 circuits is required a few additional circuits are provided.

In the new network the augmentation could be delayed until there is sufficient traffic for, say, 45 circuits at which time an additional 30 circuit module would be added. The augmentation occurs when the cost of routing the overflow traffic exceeds the cost of providing an additional module. The big cost difference is one of the major differences between the existing and the new networks as far as AR is concerned and the major economic reason for its proposed use.

The pattern of traffic flows in a network with AR is more complex than in the present network and this presents two main problem areas. The first of these is in provision of circuits for the network and the second is the behaviour of the network under failure or traffic surge conditions.

The provision of circuits for the final routes in an AR network is complex since such routes carry the various overflow traffic from the primary routes. Such traffic does not have the statistical characteristics assumed when providing circuits for FP routes and special calculations have to be made to arrive at the correct number of circuits. Traffic on final routes will grow at a faster rate than in the network as a whole at times and will, equally, be subject to sudden falls in traffic levels as the primary routes are augmented.

When an additional module is provided on a primary route it could reduce demand on the final route by as much as 15 circuits. With a number of primary routes overflowing on to one final route it can be seen that a rigid policy of providing additional modules on primary routes at fixed traffic levels could result in very uneven requirements on final routes.

It should be an objective to smooth these variations and therefore management and design of the network as an integral whole becomes important. Consequently an AR network will require more detailed call and traffic records than are available for the

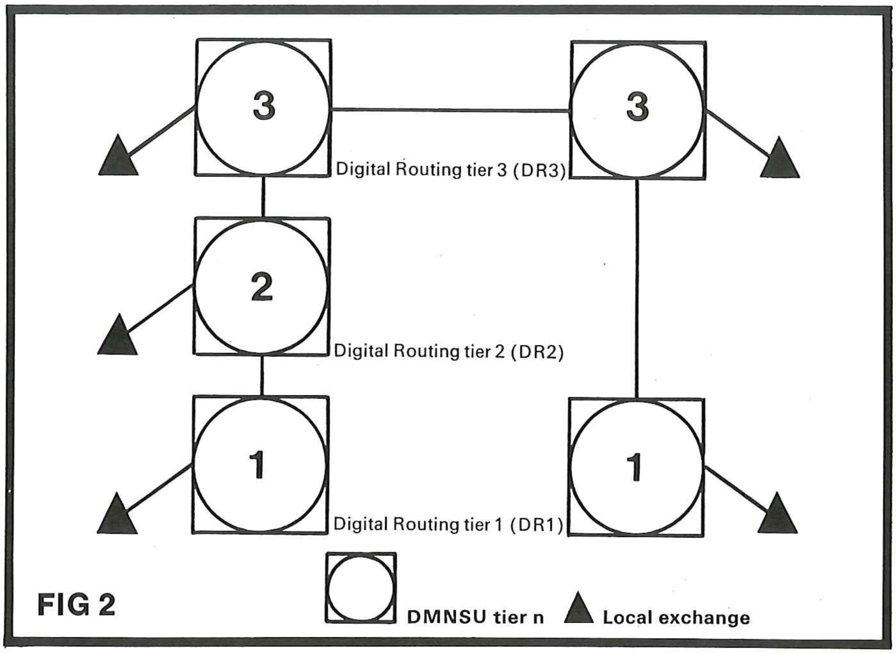


FIG 2

existing network. Thus to realise the full economic benefits of AR, computer assisted design will be required.

It has been decided that the administration of AR will be simplified by a scheme of predetermined routings. A set pattern of primary and alternative routings will be tried by a call, with this pattern only being altered by administrative action. The alternative routing will operate within a main network routing hierarchy consisting mainly of two tiers but with an intermediate tier at various peripheral parts of the network.

Thus the majority of lowest tier units, DR1, will be parented directly on top tier units, DR3, but in some places they will be parented on intermediate tier units DR2. The DR2s will be parented on DR3s, with the latter being fully interconnected with all other DR3s. This is illustrated above.

Unlike the existing Transit Switching Centres (TSCs) the higher order digital units, DR2 and DR3, will have local exchanges parented on them so that they act as "sources" and "sinks" of main network traffic as well as major tandem switching units. As the hierarchical routes will be mandatory they can function as final routes and can, therefore, provide a backstop for any AR scheme. Figure 3 (below) shows some of the possible alternative routings from origin A to destination E. Routings would be tried in the following order: AE, ABE, ABCE and finally ABCDE. In practice a number of the possible routes may not exist or it may prove undesirable to use a large number of alternatives.

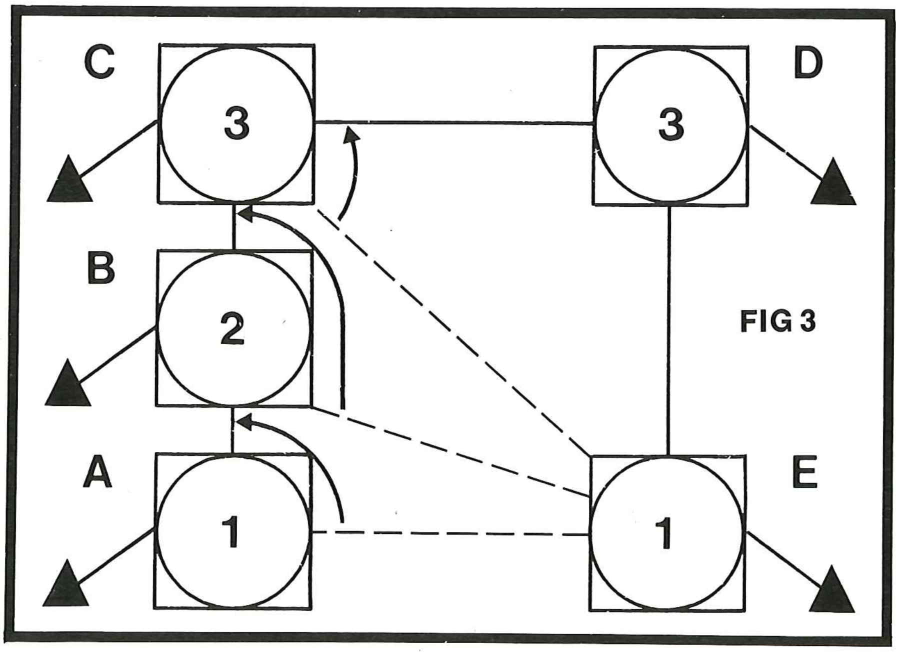


FIG 3

The other problem with AR results from its potential increase in network efficiency. If circuited as normal traffic the AR network allows for a more efficient network – higher traffic per circuit – than a network of FP routes. But such an efficient network could suffer serious service degradation if there were traffic surge or plant breakdown, resulting in congestion of certain routes. With AR such congestion could, if unchecked, have network-wide effects because traffic routes are not operating independently of each other.

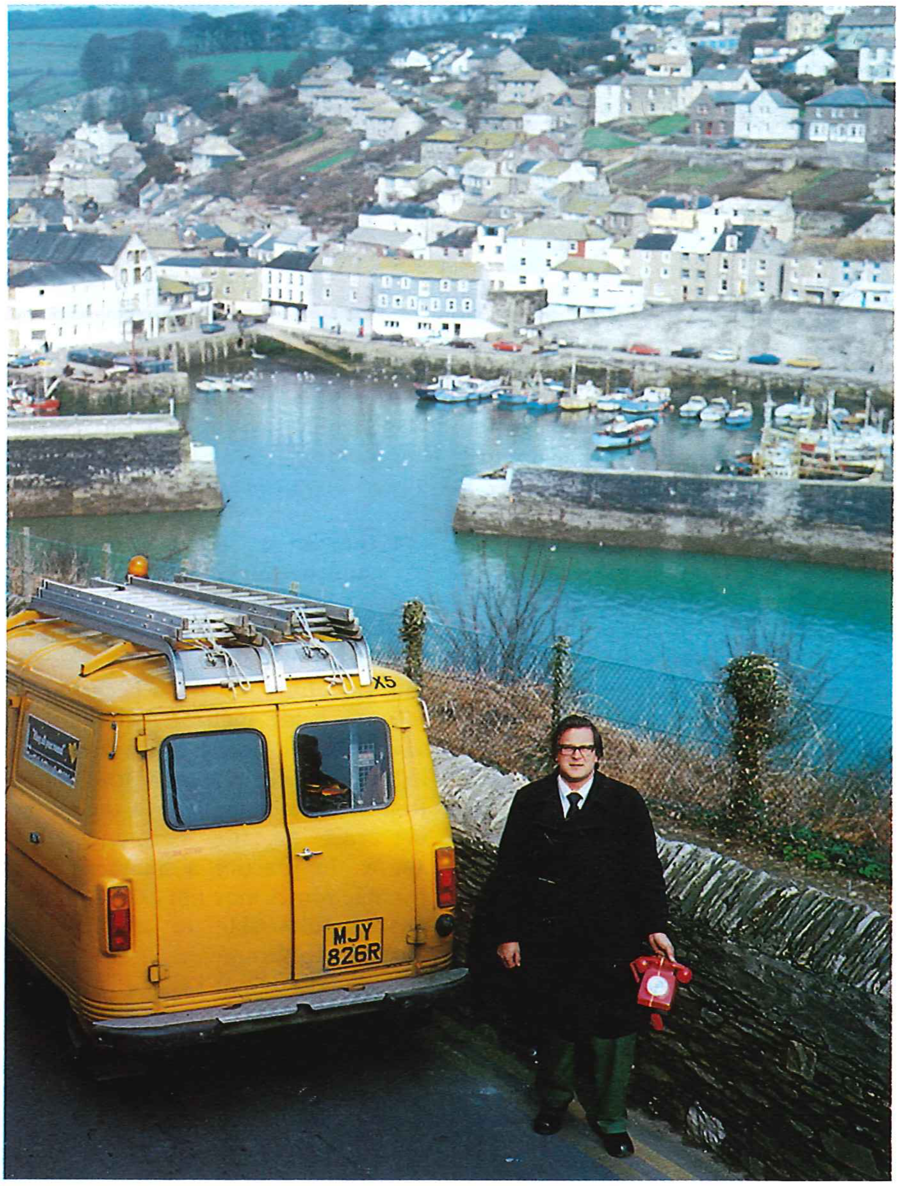
Spare capacity can be provided on the final routes to carry a certain level of overload arising from a number of sources. Additionally, and to protect the network in the event of widespread overload, controls should be available at the DMNSUs which would automatically limit the spread of the effects of congestion through the network by restricting overflow. It will be the aim when introducing AR into the network to ensure that the network will be planned to be resilient to the effects of traffic surges and breakdowns.

As the DMNSU and other System X exchanges will be processor controlled it will be possible to change routings remotely from the exchange. Given that adequate data about the state of the network is available, then excessive congestion or breakdowns could be controlled by administrative action from a Network Management Centre (NMC). These centres would need to exercise close control over AR and to use it to maximise the number of calls successful on their first attempt.

At first alternative routing will gradually be introduced into the main network between DMNSUs but for technical reasons generally not between DMNSUs and existing units. In its early application the traffic measurements available, the traffic forecasting and circuiting procedures and behaviour under overload will be checked. As experience is gained it is expected that more extensive use may be made of the AR facility between DMNSUs. It should make a useful contribution to network economics and flexibility as the digitally switched main network develops in the mid 1980s and onwards.

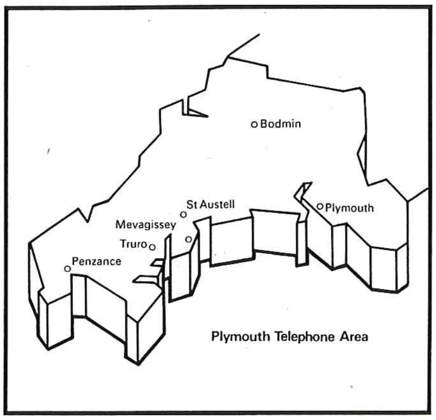
Mr J. W. Neale is a Senior Telecommunications Superintendent in Network Strategy and System X Division of THQ Network Planning Department responsible for traffic routing studies for the digital network.

A seasonal approach



With the picturesque harbour as a background, installation engineer Godfrey Nicholls prepares to connect a customer at Mevagissey.

In the ninth in our series on some of the many different jobs essential to the efficient operation of Post Office Telecommunications, **Mr Anthony Parsons**, General Manager, Plymouth Telephone Area outlines some of the seasonal problems associated with running an Area which is also a major tourist centre.



DESPITE the long and cold drab of winter – spring and summer are still a distant dream as I write – mention of Devon and Cornwall can be guaranteed to stir thoughts of bright sunny days, beaches at Torbay and St Ives, picturesque fishing villages with magical names like Polperro, Mevagissey and Newlyn, historically steeped Tintagel, Bodmin Moor and idyllically peaceful Hughtown on the Isles of Scilly.

But it isn't always like that. Indeed, at this moment catenaries of our aerial cables are held horizontal by the wind, engineers trudge at hedge height across snow-filled lanes carrying portable chargers to isolated rural communities whose only life line is the telephone. Hughtown is battered by a force nine gale and faulty lines on Tresco must wait abatement because the two-man team on the Isles are confined to St Mary's.

With beaches deserted and moors abandoned to winter ponies, the uncluttered roads are freed to our 600 vehicles. Only the weather now holds up the work of servicing our 131 exchanges and expanding and improving the system. The modernisation programme is well advanced and its random mix of TXS, TXK and TXE exchanges brings special manning problems in this scattered terrain.

Telephone demand reaches peak after peak as month succeeds month and forecasts overtaken by the economy, leave a trail of waiting

applicants in their wake. The business market is awakening and the buoyant residentials, chasing an ever cheapening service, make demands upon the system not always easy to assuage.

Telephone assistance traffic in the winter sinks to half its summer peak and switchboard complements are trimmed accordingly. Our five AMCS are as ghost towns after a gold rush but we must still ensure that the quality of service remains high to the indigenous population.

Maintenance problems are intensified in the winter. The 200-strong field maintenance work force are at full stretch in a battle against the weather which also drains other resources. Jointers, gangs, installers and fitters are engaged flat out on the flood of faults on lightning damaged cables, and others which by perversity of nature, almost always occur at night or weekends.

And getting back to normal after the winter storms is a demanding exercise. Missed appointments need to be renegotiated, external and internal jobs reprogrammed and customers who see no outward causes for delay must have the facts explained to them.

The lash of the bad weather spreads widely. Long after it is forgotten and bills begin to tumble through letterboxes, some customers seek reimbursement for loss of service. This is generally readily given, but suspect claims call for closer investigation. Files grow thick while harrassed clerks and traffic officers spend hours in correspondence with customers who, many having retired, find their extra leisure a boon for exercising their literary competence in defiance of the Post Office multi-charging system.

Despite this a good service is given to more than 175,000 customers and nearly £30 million is collected annually. Of this just over £8 million is spent on servicing the Area with its 2,300 staff, and a substantial contribution is made to central funds. On top of this another £7½ million investment capital is called upon for expanding the system with our own labour force.

The sheltered environs of the two cities of Plymouth and Truro, separated by 60 miles of Cornish roads, counterbalance with other towns the many rural communities. Their much larger switching centres, transit network and office complexes serve as the nerve centres of the Area. It is here that the planning and control are exercised which ensure that customers' needs are anticipated and met wherever and whenever they arise. And it is here, too, that orders for service are taken, processed by sales staff and, in the guise of 100,000 advice notes a year, despatched for prompt execution by some 200 installation engineers.

There is a constant need to keep the public thoroughly informed of how well the Business is serving them locally. But it is not enough just to do well. The Post Office must be seen to do well and we call on every means so to do. Local press, five Post Office Advisory Committees, BBC and commercial television and radio are all kept in the picture by press releases, personal contact and public appearances throughout the Area.

But even publicity and marketing are not enough. We must be sure that the limits of our budget for manpower and money. Amid the technology it is important not to neglect the human side of the Business for one of its greatest capital assets is its people. Recruits must be suited to the jobs they will perform, be correctly trained in their respective skills and made to use them economically and profitably.

There is a need to make sure that conditions of service are correctly and properly applied, that disciplinary procedures are wisely interpreted and reasonable career expectations fulfilled. All these human factors are handled with understanding by more senior staff in close co-operation with the eight different unions in the Area, both informally and by way of the joint consultative machinery. Numerous committees with a multitude of objectives oversee the Area's many activities ranging from the Area Policy Committee down to its Safety Committees whose titles are self explanatory.

The Plymouth Area Board in session: Left to right Mr Parsons, Mrs J. Ball (Secretary), Mr C. J. Roberts (Head of External Planning and Works Division), Mr E. O. Finch (Sales Manager), Mr G. T. Balment (Head of Installations), Mr L. J. Reece (Head of Maintenance), Mr G. W. Tugwell (Head of Service Division), Mr L. R. Baker (Head of Internal Planning and Works Division) and Mr B. C. Makin (Head of Accounts and Personnel Division).

technology on which we depend is functioning properly, is properly maintained, and that it is augmented soberly towards tomorrow undiverted by transient fashions. After all our bread and butter is in selling telephone time to those who want it when they want it.

The seven members of the Area Board, guided by the General Manager, meet regularly to formulate plans for doing just that; to monitor the quality of service given and to take corrective action where required and ensure that all is done within the

In the 1,850 square miles of the Area from Torcross to Lands End no-one is marking time. Everyone is working hard to meet the growing demands of a business which they themselves have chosen as their career in the knowledge that the better the service given, the more will this be recognized and appreciated by most of their customers, who might, perchance, be their neighbours or gracing their beaches when the summer sun finally shines again.

PO Telecommunications Journal, Spring 1979

Neil Johannessen examines an early extension telephone with Ericsson type handset, probably turn-of-the-century vintage.

A future in the past

The Post Office is to set up its first National Telecommunications Museum in London during the next couple of years, and the man with the key role in its development is its curator, 25-year-old, ex-Assistant Executive Engineer Neil Johannessen. Here, Nottingham University graduate Neil outlines his plans for the project.

THE NEW national Telecommunications Museum, organised by London Telecommunications Region will complement the valuable work of existing Post Office Telecommunications Museums in Taunton and Oxford as well as various Institution of Post Office Electrical Engineers collections throughout the country.

Based in new premises at Baynard House near Blackfriars in the City of London, the museum occupies about 500 square metres and will feature equipment ranging from telephones, switchboards, repeaters and cables to switches and valves and telegraph equipment. It will also include historic vehicles and old style forms and documents. In short, it will be a comprehensive and wide ranging collection presenting the story of British telecommunications from earliest days up to the present time. And a special section will also be devoted to future plans and developments. Two-thirds of the total area will be used for display purposes and the remainder allocated to archives, workshop and office.

With so many distinct fields under the umbrella of telecommunications, it is necessary to divide the displays into selected topics such as telephone switching, manual boards, radio telegraphs and so on. Intended mainly for the layman because space limitations prevent catering for the expert in every field, each area will have at least a smattering of coverage while a large "basic history" section will be provided to summarise the whole subject.

Space has been set aside for a series of variable exhibitions which will cover some subjects in more detail – probably following on from special studies that are also planned to be featured regularly. Guides will be available to escort visitors.

A particularly valuable aspect of the museum's work will be to co-ordinate its efforts with other Post Office and IPOEE museums notably on matters such as cataloguing and loans. Additionally, relationships are already being established with similar non-Post Office organisations like the Science Museum and the Museums Association.

And as soon as the expertise is available, it is hoped to be able to provide a skilled advisory service including identification and dating of items as it is pointless displaying material that cannot be understood. Special projects will also be mounted studying specific fields of interest and facilities will be provided for others to do so.

The historic vehicles are expected to make trips out and extra publicity will be sought from talks and the issue of papers and books. The aim is to keep pace with history by adding to the collection but at the same time trying to find a use for every item instead of leaving it in store. So, if you have or know of any items which you might think be of interest or have any query about the museum, Neil Johannessen will be delighted to hear from you on 01-622 2738.

PO Telecommunications Journal, Spring 1979

The measure of quality

In the second in our series of articles on the basic automatic inland telephone service, **Mr C. H. Makepeace,** Head of Operator Services Division in THQ Service Department, outlines how the quality of the inland operator service is measured. A further article will discuss future development.

DQ operators working at Southampton-type sleeve control switchboards.

"RUMOURS of the approaching demise of the inland operator service are somewhat premature." Apologies are due to Mark Twain for the sort of jibe which two or three years ago many people in the service might have found rather too close for comfort. At that time manual board traffic had dropped like a stone due to the approach of full subscriber trunk dialling (STD) facilities, the mid 1970s oil price recession, and the drastic call tariff increases. It all meant that the inland operating force, whose numbers depend ultimately on measured customer work-demand, fell by more than 25 per cent in two years.

Some people consequently extrapolated this trend and foresaw the effective disappearance of the service soon after 1980. Others simply compared the situation with that in other European administrations, where in most cases the operator service has been pared down to the minimum necessary to support only the automatic system. But by early 1977 thoughts were turning towards making the operator service more customer effective rather than concentrating on the scope for reducing its costs. This trend was powerfully reinforced when Post Office Chairman, Sir William Barlow, began to stress the need for all-round higher standards of customer service.

This general objective related in part to the need to be seen to justify – by giving better value for – the higher profits which the Post Office made from 1976/77 onwards. For the inland operator service the argument applies in reverse. The service is a major current account cost to the Telecommunications Business – more than £158 million in 1977/78.

Forecast revenue from chargeable operator calls which can be set against the cost is only £40 million. Customers, therefore, subsidised the service by £118 million last year – a deficit that can only increase. Obviously a measure of subsidy is inevitable but a duty exists, sustained by clear commercial need, for this expenditure to give good quality and good value service.

The operator service is essentially a human service. It works through people to help people. Operators themselves, with supervisors and managers, are the service; the machines and procedures they use are ancillary. The service, which is a local responsibility, is crucially dependent on the skill, effort and goodwill of staff and managers in the Telephone Areas. Problems must be dealt with and decisions made as the need arises; in operational matters the role of Regions and THQ Service Department is a supporting and enabling one.

Longer term objectives, however, and specific performance targets are fixed through dialogues in which THQ Service Department plays a prominent part. It is currently a Business objective to improve the quality of the operator service especially the time in answering calls. In pre-Corporation days great stress was laid on Time to Answer (TTA) and along with the Waiting List for provision of service,

sometimes seemed to be the only performance indicators which MPs and newspapers cared about. Now, even within the operator service, answering speed is no longer all important.

TTA is the average time measured for a number of calls, between presentation to the AMC, and the operator answering. About four years ago this familiar index was replaced by percentage of calls answered in so many seconds (PCA). Both methods derive mainly from service observation although CSS1 automanual centres are equipped with meters which measure on a sample of one call in five, and these are included in PCA statistics.

In both cases the time is measured from when the caller hears ringing tone – on a cord board the calling signal lights up – until the operator answers. The wait as seen by the operator, or the time in the queue in a CSS1 AMC, is measured rather than the wait experienced by the caller, which is longer because it includes the time in which the call to the AMC is set up. The difference between TTA and PCA lies in the way these individual waiting times are aggregated.

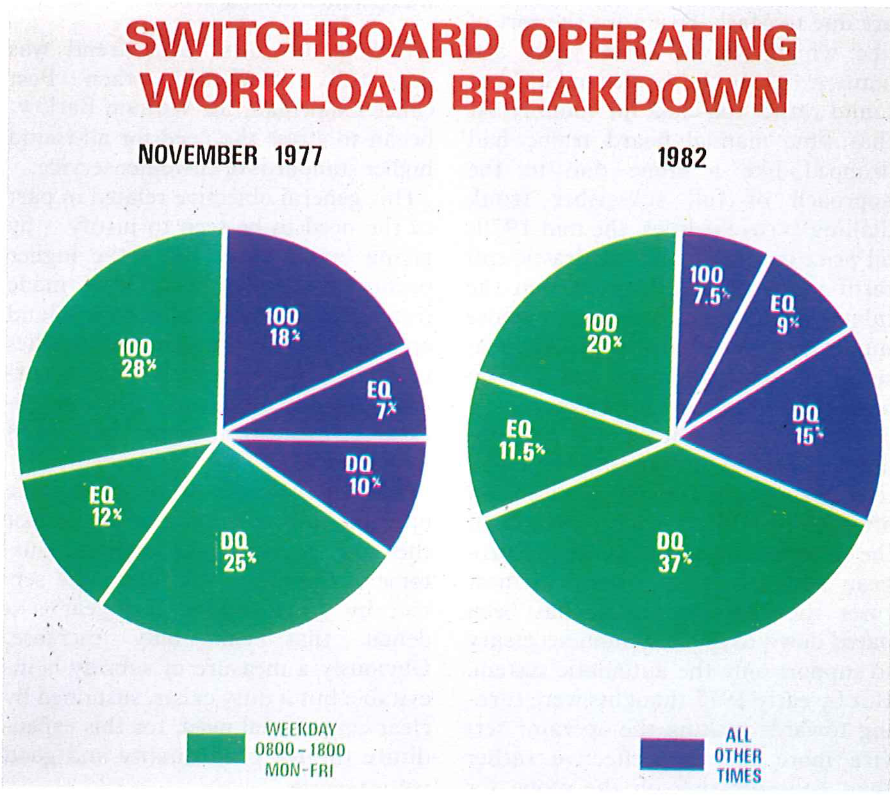
The advantage of PCA over TTA is that, if the threshold is correctly chosen, it provides a better measure of the subjective experience of the caller. If 8–10 seconds is accepted as a reasonable time for callers to wait for an answer from dialling "100" then the benefit from a very fast answer in two seconds does not offset the irritation of waiting 20 seconds, which is twice the usual time.

It is possible to construct empirical relationships between TTA and PCA – at a specified threshold – for calls which are answered at random as at a cord board where operators answer signals unselectively rather than favouring (or shunning!) ones which have been waiting a long time. It is also possible to derive a different relationship for calls which join a queue and are answered successively.

But let us look at how the total quantity of operator work at the switchboard, measured in November 1977, and the latest data available, is divided in proportion to the relative size of the six divisions of the service. This traffic is measured in valued calls, a work measurement unit which dates from before the First World War, and enables different types of transaction, taking different unit times to handle, to be aggregated together. This allows, for example, for the fact that, an average, directory enquiry transaction takes less time to handle than operator facility calls.

Operators at works on cordless switchboards of the type which have been installed at exchanges throughout the country in recent years.

The trend, in fact, is for DQ traffic to grow at about eight per cent per annum, following the growth of the system, whereas "100" level traffic, now largely made up of facility calls, is static or contracting. A highly tentative extrapolation of present trends suggests that in three years time the breakdown could be as illustrated below. To some extent this trend calls in question the accepted measures of operator answering performance. On weekdays there are already many



A modern DQ bureau with its open plan layout and office type furniture.

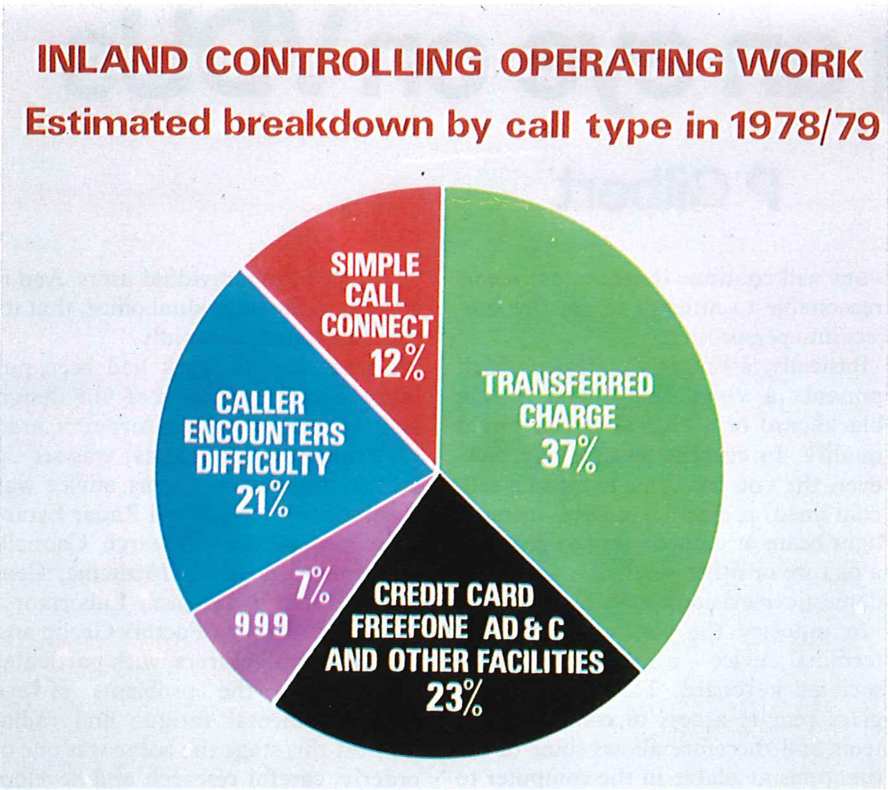
more calls to DQ than to "100" and callers wait much longer for an answer although individually each DQ call is handled more quickly.

Two other factors of importance are the way in which answering performance is measured, and the targets which are set. For most inland AMCs the answering performance, and many other aspects of the quality of operator and automatic service given to customers, are measured by remote service observations. Observers drawn from the Assistant Supervisor grade sit at consoles connected by tapping circuits arranged so that a random sample of calls to the operator is monitored. Service observations, used to monitor key aspects of the call connect service, are an important and costly aid to management. Altogether the function employs about 550 people in 110 centres up and down the country, at an annual cost in the region of about £4 million.

Despite this expenditure, a major share of which has still to be devoted to monitoring the automatic system, observations of the automanual service are incomplete. No observations are taken on the EQ service, nor, except at local discretion for special purposes, are observations taken on AMCs which have five or less positions staffed in the busy hour. This is because of the difficulty of getting a useful sample from the population of calls using existing technical methods. But it means that observations on 36 out of the total of 295 AMCs do not normally appear in Area, Regional and National summaries. Even where observations are taken, coverage is limited to the period 0800 to 2030 Monday to Friday.

The problem in taking observations in the through-night period or Sundays, for example, is clearly not only one of sample size but also of high cost and the unsocial hours which observers would have to work. It could be argued that since so few calls are made at these times the service is experienced by few customers and so its quality is less important. The calls, however, are probably more important to the customer to be made at that time in the first place.

When an operator answers, the customer wants a facility call or the answer to a directory enquiry, provided precisely, quickly and courteously whatever time of night or day. In reality about 20 other factors on how well the call is dealt with are separately observed including measures of calls not connected because of failings of the caller, the destination customer, the automatic network and the operator. Also listed are procedural and charging irregularities. And it is a fact that although "well handled" calls are identified and measured, they are defined in terms of procedures and take little or no cognizance of the style and attitude of the way the operator deals with the caller and many other possible areas of improvement. But that is an area which will be discussed in a future issue . . .



Mrs Gillian Evans, (right) Area Nursing Officer in the Occupational Health Service uses a MAVIS machine for testing the eyesight of a potential VDU user.

Keeping an eye on VDUs

P Gilbert

VISUAL display units (VDUS) are probably the most significant innovation on the office scene since the introduction of dictation machines. Yet although they have been used in this country for about 15 years it is only very recently that they have aroused any comment in the health field.

In the last few years, their use in a wide variety of work situations has highlighted for employees, management and unions some possible problems which have led to considerable comment in the national, medical, scientific and technical Press. Some has been objective, much highly subjective and a little so biased as to be frankly ludicrous. Since the use of VDUS will continue to increase it seems reasonable to attempt to get the subject into perspective.

Basically, a VDU is any device which presents a visual image and thus a blackboard or a cinema screen would qualify. In current terminology however, the VDU has come to mean a self-contained projection device using a light beam or cathode rays to generate a picture or other symbols – such as a domestic television receiver.

In industry the VDU is a computer terminal device – a screen with an associated keyboard. Through cables it gives remote access to computer systems and therefore allows some of the functions available in the computer to be extended to individual users. And it is here, in the individual office, that its use is extending so rapidly.

A great deal of work had been put into the various aspects of VDU design and when the London Airport Cargo Electronic System (LACES) was set up by the Post Office, expert advice was obtained from the Royal Radar Establishment, Medical Research Council, Institute of Aviation Medicine, Central Electricity Research Laboratory, Post Office Human Factors Group and several manufacturers, with particular reference to the problems of eye "strain", mental fatigue and radiation. At this stage the scene was one of orderly, careful research and develop-

ment associated with the increasing use of VDUs without any significant health problems becoming apparent.

In April 1975 it was learned that a report had been issued by the Chief Medical Officer of the French Post Office which was alleged to conclude that nobody over the age of 45 should work at a VDU, nobody should work with one for more than four hours a day and that before beginning work, all operators should have a "full ophthalmological examination". These statements received extensive press coverage and once a copy of the report had been obtained, and translated, it soon became clear that the press reports had been incomplete and inaccurate.

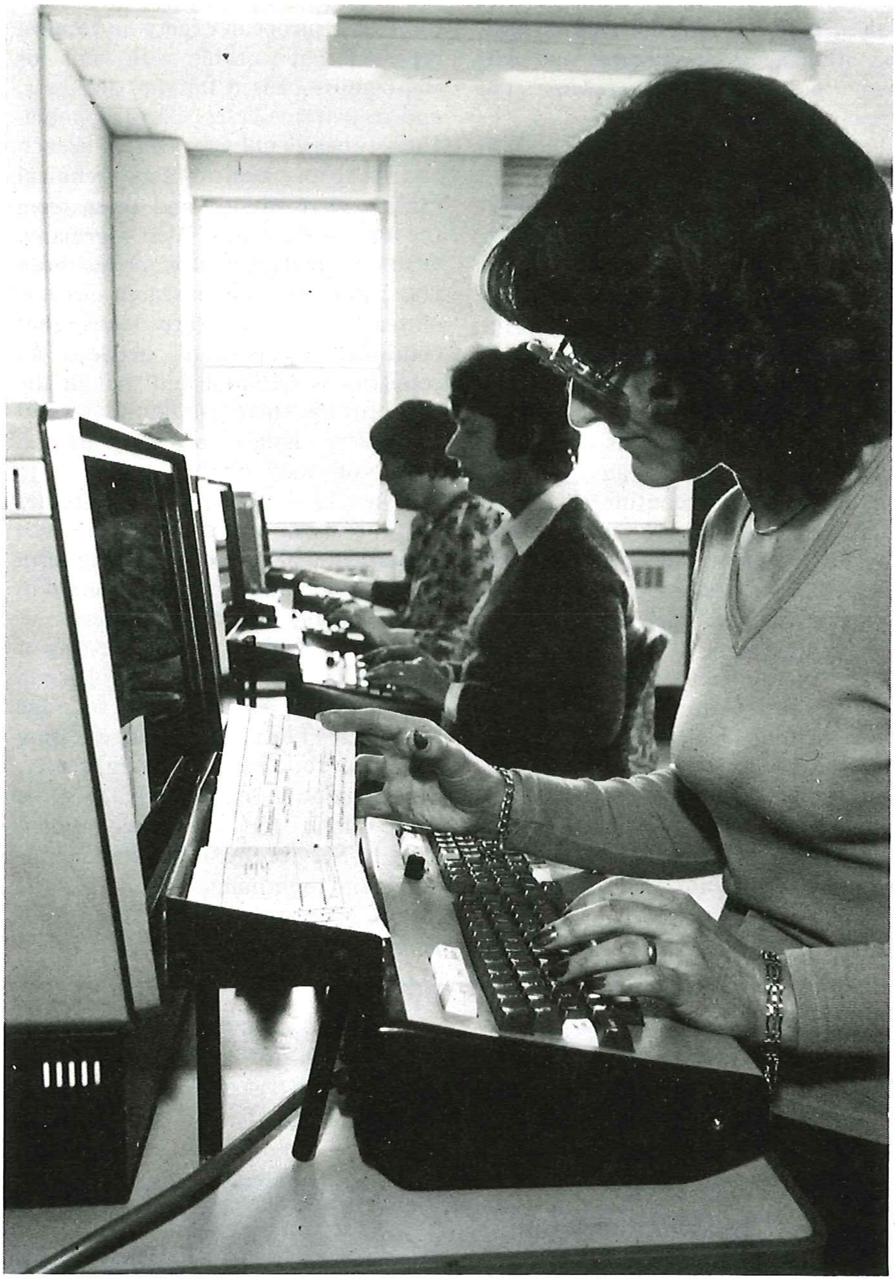
Firstly the study had only been concerned with the training of VDU operators and the statements about age and daily hours referred only to this situation. Furthermore the report made it clear that no damage to eyesight or other physical disease had been found in the study. The report did, however, agree with the views already expressed in this country that the ergonomic aspects of VDU work were extremely important.

Meanwhile advice had been sought from experts in the visual health field such as the Institute of Ophthalmology, the Faculty of Ophthalmologists, the Association of Optical Practitioners and the Optical Information Council. All agreed that the use of VDUs as such would not damage eyesight and that acceleration of the normal ageing process was highly unlikely. It seemed, however, that no specific study had ever been undertaken to confirm this view.

Apart from the fears that use of VDUs might adversely affect visual acuity there are a number of other potential hazards to health which have sometimes been raised. Inevitably, in view of early concern regarding radiation when domestic television sets were introduced on a large scale, the spectre of radiation from VDUs has been raised.

In the Post Office large numbers of VDUs have been monitored for ionising and non-ionising radiation with "nil detected" results.

The problem of photic epilepsy arose in the early days of television and was recognised to be frequency related, in that low frequency or coarse flicker – for example from a badly adjusted set – was more likely to cause flicker-induced photic fits in susceptible subjects. Fortunately the "refresh rate" of the modern VDU screen is at least 50 Hz as opposed to about 25 Hz for the domestic set. The likelihood therefore of flicker-induced fits due to viewing a VDU screen is extremely remote.



Staff in Newbury Telephone Area use VDUs to key in details of phone bill payments, direct from customers' counterfoils.

Predictably a wide range of subjective or "psychological" symptoms has been reported, such as tiredness, headaches, giddiness, nausea, irritability, anxiety and depression. There is no evidence to link the incidence of these symptoms directly with the viewing of a VDU screen, but poor ergonomic design and working arrangements can certainly aggravate or even cause fatigue and its associated subjective symptoms.

One area in which a problem was recognised early on with the introduction of VDUs was that there were a few people whose spectacles were of a focal length unsuited to the distance from the eye to the screen. This can be dealt with by a reading correction specific for the viewing distance for VDU operation, or provision of sufficient flexibility in the system to allow the screen to be moved closer to the operator rather than vice versa.

From the practical considerations it seemed that the bifocal spectacle wearer might be in greater difficulty, because people wearing such glasses might tend to adopt a fatiguing head posture with resulting headaches, neck pains or discomfort. This appears to have caused little trouble in practice.

The ergonomic aspects of work with VDUs are also of great importance, and can be divided into certain important areas, to which particular attention should be paid, such as heating, venti-

lation, lighting, and the type of seating allowing a comfortable and efficient posture while viewing the display.

The display itself should be considered in terms of viewing distance, screen tilt, display size, character clarity, colours of image and background, and contrast and luminosity. With many characteristics of the system it is advisable, wherever practicable, for the operator to have a degree of control over, say; brightness and positioning of the screen.

Since the use of VDUs is now widespread in most European countries, there has been and continues to be coordinated co-operative investigation into all the aspects of VDU work. Projects are in progress at the Universities of Berlin, Vienna, Paris and in the UK at Loughborough.

The research teams at Loughborough and Berlin are sponsored by IFRA (Inco Fieg Research Association), an international organisation based at Darmstadt, West Germany, which specialises in newspaper technology. In turn IFRA liaises closely with VDU manufacturers and trades unions all over Europe.

Early in 1978 a meeting of more than 100 European experts in Geneva reported that working with VDUs for eight hours caused fatigue, dizziness, and in extreme cases, claustrophobia. Unfortunately only the Dutch, French and Belgian medical and technical experts were invited and those from the UK, Sweden and West Germany, where a great deal of work has been done, were not. The research director of IFRA has subsequently stated that continued co-operation between all countries is essential and that in the near future there would be several pamphlets issued on the human aspects of work with VDUs.

In view of the lack of formal studies into the visual aspects, the Post Office decided in 1977 to set up a long term investigation over a five-year period in the Telecommunications Business.

The trial involves the sight testing of 450 VDU operators and a control group of similar size, matched for sex, age and grade. The comprehensive testing of visual function, including acuity, accommodation, muscle balance, is being done for the Occupational Health Service by ophthalmic opticians and ophthalmologists with the results presented on a standard form agreed with the Association of Optical Practitioners. Re-testing will be carried out after three years and again after five years. Initial testing has been completed and although no results will be available for at least five years they should eventually settle the emotive question of whether or not VDU work adversely affects eyesight.

It may seem strange that so much concern has been generated over a task which involves looking at what is basically a small television screen. There are, however, differences in the two situations – some good, some bad. Watching a domestic television set involves freedom of choice – operating a VDU at work does not.

Against this, the quality of the display on a VDU is superior in most respects to displays produced on domestic colour television sets, when both are correctly adjusted. At present there is no objective evidence that working with VDUs constitutes a health hazard, but the ergonomic factors of the total work situation do undoubtedly merit continuing attention.

Dr P. Gilbert, is Principal Medical Officer for Post Office Telecommunications.

PO Telecommunications Journal, Spring 1979

Quality of telephone service October to December 1978

Figures in brackets indicate performance during the previous quarter (July to September 1978)

		National averages	
Local automatic telephone service	Calls connected successfully	**63.2%**	(63.3%)
	Calls which obtain 'engaged' or 'no reply'	**28.4%**	(28.2%)
	Calls that fail due to the customer	**6.9%**	(7.0%)
	Calls that fail due to the Post Office	**1.5%**	(1.5%)
STD automatic telephone service	Calls connected successfully	**63.9%**	(63.5%)
	Calls which obtain 'engaged' or 'no reply'	**24.7%**	(24.0%)
	Calls that fail due to the customer	**8.2%**	(8.7%)
	Calls that fail due to the Post Office	**3.2%**	(3.8%)
Repair service	Yearly fault reports per telephone	**0.65%**	(0.56%)
	Fault reports cleared by end of next working day	**68.5%**	(34.8%)
Inland telephone operator service	Calls answered within 15 seconds	**86.4%**	(82.7%)
International automatic telephone service (IDD)	Calls connected successfully	**37.6%**	(37.1%)*
	Calls that fail in the international automatic exchanges	**4.9%**	(5.4%)*
	Calls that fail due to other causes	**57.5%**	(57.5%)*
International telephone operator service	Calls answered within 15 seconds	**59.5%**	(32.0%)

* Figures are based on July and September. No records were available in August as a result of industrial action

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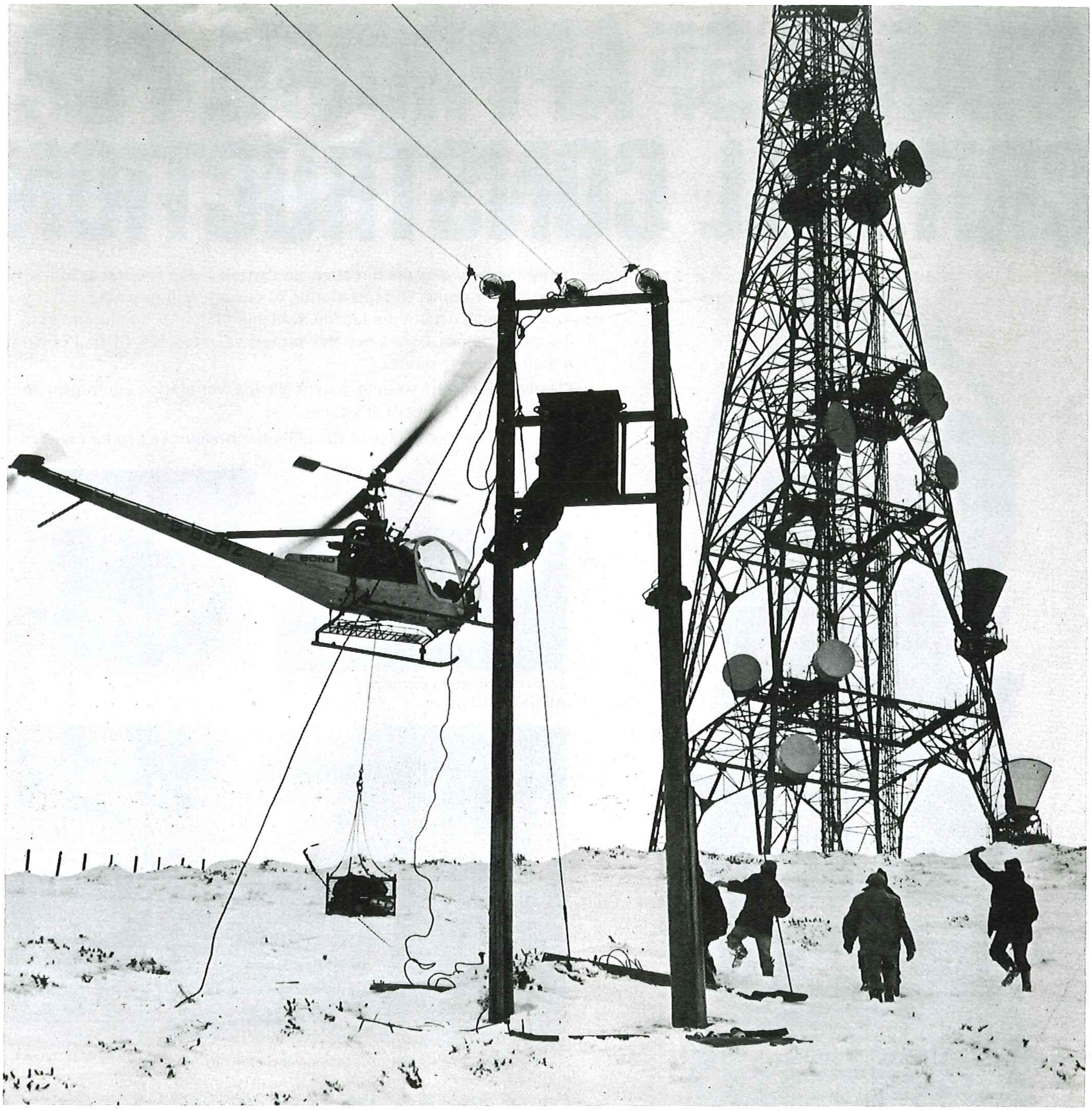


Winter's bitter grip

WITH the scent of spring firmly in the air and the promise of summer not too far away, most memories of the long, hard winter have now passed into the pages of the history and record books.

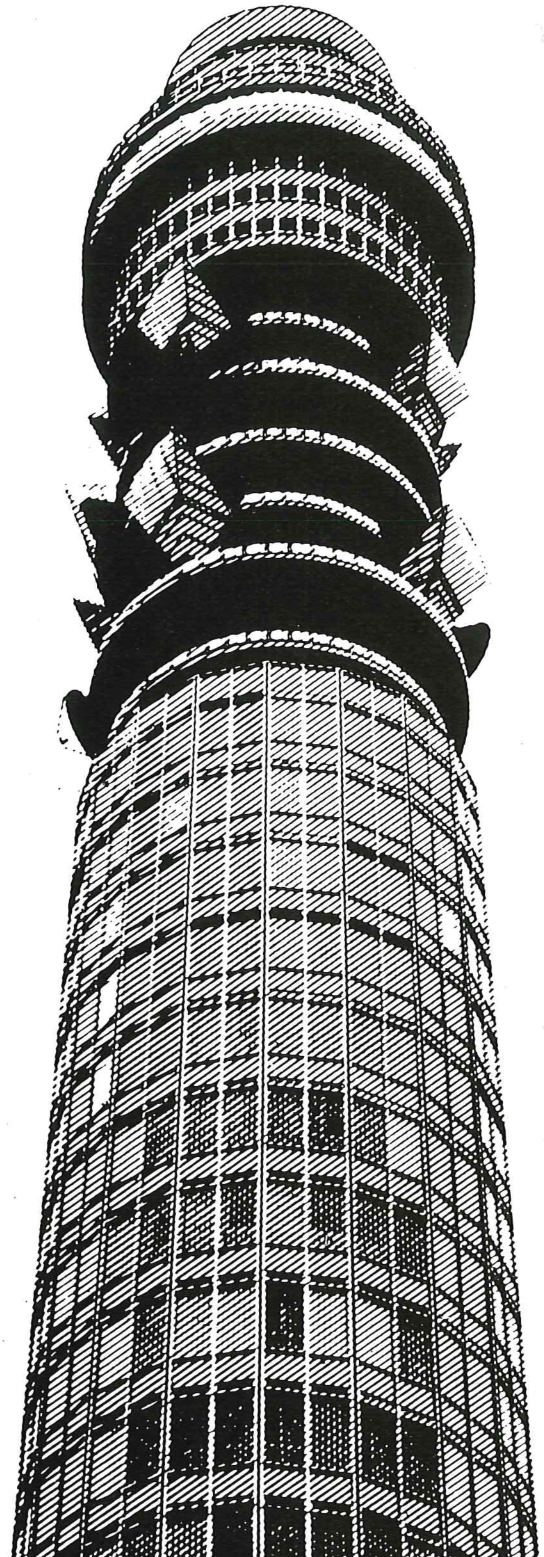
But, wherever statistics and extremes become a talking point in the years to come, the winter of 1979 is one that is bound to be quoted. In Post Office Telecommunications terms it was one where Scottish THQ suffered a burst pipe and serious flooding in Caledonian House; where the temperature plummeted to minus 25 degrees Centigrade at Carnwath, Lanarkshire – and where a dozen staff at Goonhilly satellite station worked their longest shift ever – three days – because their relief crew could not penetrate heavy snow.

In Kent, gales whipped up a 40 foot wave over Sheerness sea defences and the telephone exchange suddenly became an island outpost surrounded by sea water. Staff worked day and night to keep water levels below live racks and power supply equipment and further north round-the-clock efforts of engineers and other staff averted a complete shutdown of York exchange. Repair crews worked through New Year holidays to clear 18,000 faults in the Newcastle-on-Tyne area; and finally with the advent of the thaw – came flooding!

It was a winter which produced a fine crop of Christmas card pictures and a bumper season for snowballers, but it also called for great determination and effort from Post Office staff to keep communications open.

PO Telecommunications Journal, Spring 1979

STAMP OF APPROVAL FOR CRITTALL CONSTRUCTION



'Only the best' was the directive. So Crittall's won the stamp of approval for design and installation of curtain walling at the P.O. Tower. And Crittall's are readily available to discuss similar projects. To augment vast experience and impressive resources, Crittall's operate a national fixing service.

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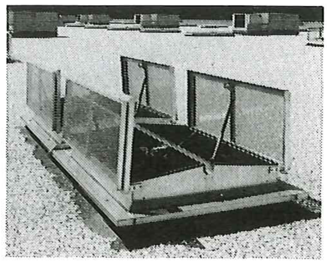
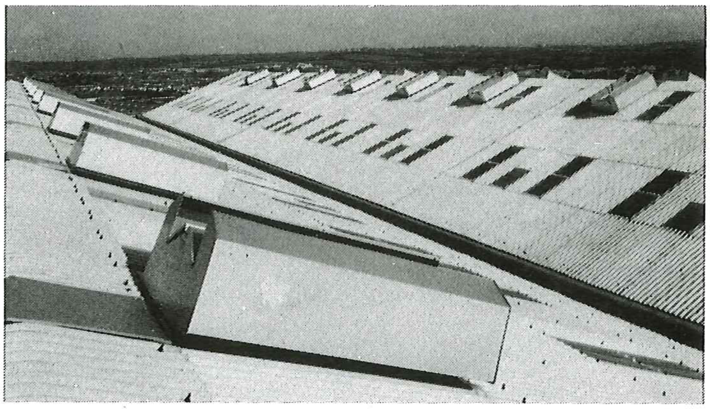
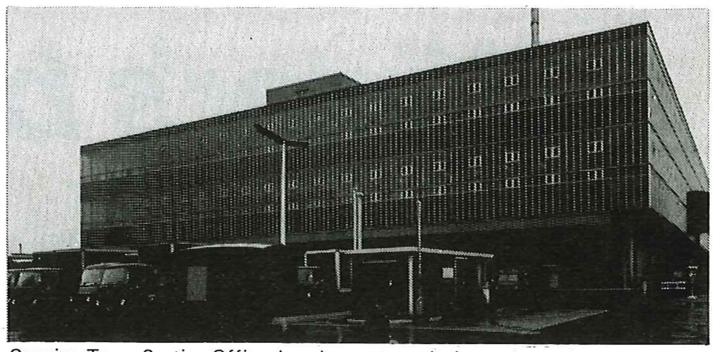
Seen below are examples of Crittall's comprehensive product range.



Smoke Ventilation Extraction equipment.
Above: H.A.L. type. Right: 'Firelite' type



Environmental or smoke–extraction ventilator, 'Firefly' type.



Canning Town Sorting Office, London; patent glazing and curtain walling by Crittall Construction.

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MISCELLANY

Prestel goes public

Prestel, the Post Office's viewdata system which enables people to call up information over their telephones and have it displayed in words and diagrams on their television screens, has become the first such system in the world to be offered to the public.

Initially only available to residents of London, it is planned to be extended to Birmingham, Manchester and Edinburgh later this year with coverage of the rest of the country following progressively during the next few years.

At present about 150,000 screen "pages" covering a wide range of subjects are available and information ranging from weather reports and train timetables to share prices and car buying guides is provided by more than 100 organisations.

The first Prestel sets are currently being demonstrated at selected television showrooms in London and eventually these will be made by all major British television manufacturers for distribution through most retail and rental organisations. Coin-operated sets are also being installed in public buildings throughout the capital.

The Post Office has already been exploiting its world lead with sales of the technology involved to West Germany, the Netherlands, Hong Kong and the USA. Further negotiations with other countries are also underway.

IPSS launched

Another world first has been achieved by the Post Office with the launch of a public intercontinental packet-switched data service formally inaugurated by Mr Peter Benton, Managing Director, Telecommunications.

Packet-switching, in which data is transferred in self-contained, self-addressed blocks or packets, means that customers' terminals no longer need to be compatible with those of the databank computers. It also provides a high degree of efficiency between individual users sharing the international network.

Contracts

Standard Telephone & Cables Ltd – £6 million for more than 200,000 Trimphones including the standard rotary dial model and new, batteryless pushbutton style recently introduced nationally.
Motorola Communications – £1 million for the supply of 5,000 radio paging units and terminal extension equipment.
Multitone Electric Co Ltd – £1 million for a further 10,000 RB 111C pocket radio paging receivers for use in the London and Thames Valley paging services.
GEC Computers Ltd – £66,000 for a GEC 4070 computer system to be used in the investigation and design aspects of paging control equipment.
Redifon Telecommunications – £750,000 for VHF paging transmitters to be used in the proposed national introduction of radio paging.
Plessey Electronic Systems – £70,000 for a PRD 1100 MK II radio relay system for offshore link equipment.
GEC-Elliot Process Automation Ltd – £42,000 for a further 295 Teledata signalling units.
Birkbys Plastics Ltd – £1 million for supplying telephone mouldings.
Plessey Communications & Data Systems Ltd – £4 million to include 23,250 10-line and 11,800 20-line key-and-lamp systems, 350 PABXs and two Strowger tandem PABXs for use by the Royal Air Force.

New appointments

The new Deputy Managing Directors, Telecommunications, to take up their appointments in July are Mr John Harper, currently Assistant Managing Director and Mr John Whyte who is Senior Director, Development.

The new Senior Director, Network, will be Mr Ron Back, Director, Service Department and Mr Gordon Pocock, Director, Marketing Department, will become Senior Director, Customer Products and Services. The appointments follow the retirement of Deputy Managing Director, Mr Kenneth Cadbury and Mr Ron Martin, Senior Director, Customer Services.

Other appointments following retirements and organisational changes have resulted in Mr Michael Morris, formerly Director, Management Services, becoming Director, External Telecommunications Executive, and Mr Eric Forbes taking over the Chairmanship of the South West Telecommunications Board from Mr Trevor Urben who has retired.

Four new models

Post Office Telecommunications displayed four new phones at this year's Ideal Home Exhibition in London. The new models extend the range to 19 styles, and include a contemporary, leather covered variation of the popular Trimphone – the Deltaphone, and the Classic – a replica of the Victorian pattern.

For racing fans

Horse racing fans in London can now get race-by-race results by dialling 168. This new service is provided with information from the William Hill Organisation and runs Monday to Saturday – covering major meetings each day.

The names and starting prices of the winner and place horses, the name of the favourite, the number of runners and non-runners are given and updated race-by-race. At the end of the day there is a results summary.

Sickness figures

The average Post Office employee has a sick rate of some 15 calendar days per

The range of telephones on show at the Ideal Home Exhibition (See 'Four new models')

year – a record better than most other industrial organisations. These are the findings in a report for 1977–78 presented by the Corporations's chief medical officer, Dr Peter Taylor, and based on a sample of 24,554 staff.

Overall comparisons with available national figures and with rates from other industrial organisations show that Post Office sickness absence is at a relatively low level.

The year saw a rise of five per cent in the overall sick rate of Post Office staff compared with the previous year. This was more marked among telecommunications staff than those on the postal side and in women more than men.

In the Post Office as a whole almost one quarter of men and 16 per cent of women employed throughout the year took no sick leave of any sort although the sick leave trend among younger staff was upward.

Television campaign

The Post Office's External Telecommunications Executive is launching a vigorous advertising campaign to promote increased use of international facilities. The aim is to publicise spare international capacity available during those hours not used to the full by the nation's businessmen.

Market research has shown that few customers realise how low overseas call costs can be. The three year campaign begins with seven "bursts" of television advertising, initially with 30-second commercials later expanding to 45-second spots.

Alarm calls

Recently released figures show that some 7,500,000 calls are made to the Post Office's telephone alarm service every year. For 24p customers can arrange with the operator to be rung at a set time day or night making the service useful not only for the popular "wake-up" calls but as a reminder for any important task.

Better business phones

The Post Office's new all-electronic office phone system is expected to become available next year. The new equipment uses microprocessor control to provide small-to-medium sized businesses with a wide range of new facilities previously only available on the large "tailor-made" PABX installations supplied by private industry.

Known as Customer Digital Switching System No 1 (CDSS1), the new equipment, together with the Small Business System (SBS) announced recently, will enable the Post Office to offer a comprehensive range of advanced office phone systems matching the best in the world.

Paying with stamps

A new "instalment" method of paying telephone bills with special telephone stamps costing £1 each, has been made available by the Post Office together with free cards for holding the stamps.

When presented for payment too few stamps will need to be made up to the correct amount of the bill with cash or cheques, and if there is a surplus, stamps will be credited for future use with the issue of a fresh card and stamps to the value of the excess.

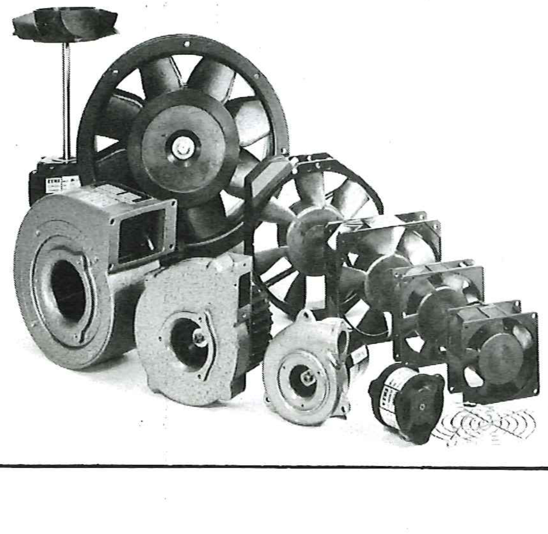
More trunk calls

Latest Post Office figures show that Britain's telephone users made 741 million trunk calls in the last quarter of 1978. This was an increase of 70 million calls, a 10.4 per cent increase over the same quarter in the previous year. Nearly 98 per cent were dialled direct by customers using Subscriber Trunk Dialling (STD).

Rally by phone

Telephone progress reports and general information went nationwide for the first time during this year's Mintex International Car Rally. Previously a telephone information service had only been available to subscribers living in the north-east of England.

Recordings began three days before the start of the rally, featuring news and interviews with drivers. Tapes were changed every four hours and with the rally underway, included regular position movements until the finish.



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Contributions:
The Editorial Board will be glad to consider articles of general interest in the telecommunications field from all sources. No guarantee of publication can be given. The ideal length of such articles is between 1,000 and 1,500 words. The views of contributors are not necessarily those of the Board or of the Post Office.

Correspondence:
Communications should be addressed to the Editor, Post Office Telecommunications Journal, Public Relations Department, Post Office Central Headquarters, 23 Howland St, London W1P 6HQ.
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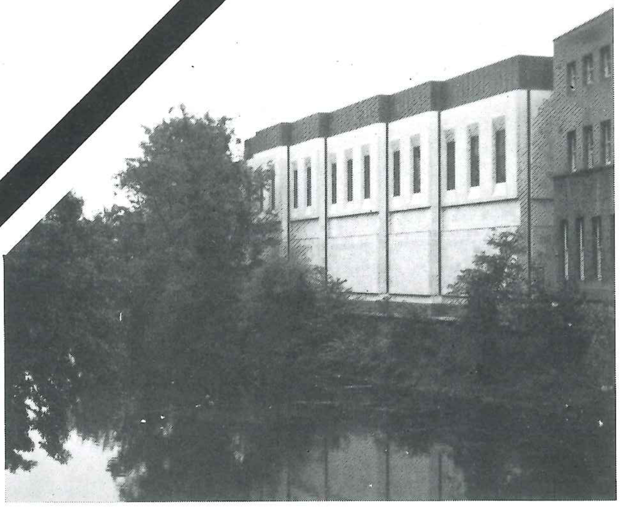
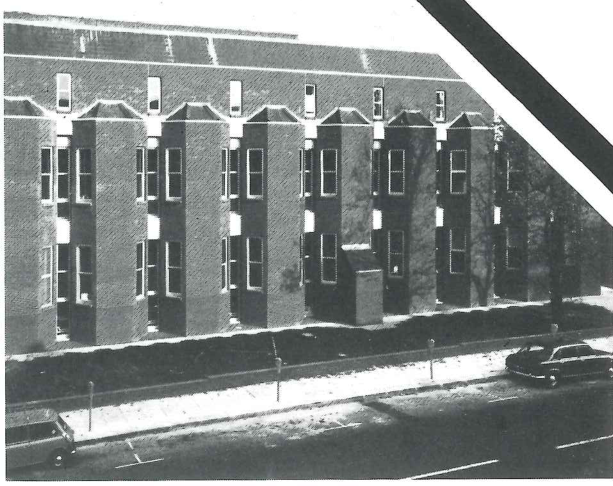


Refurbishment and new extension, B.P.O., Leamington Spa.



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New motor transport training school at Stone, Staffs.

Millbuck House, Headquarters of the Miller Buckley Group.

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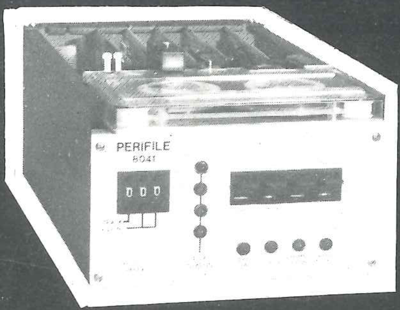

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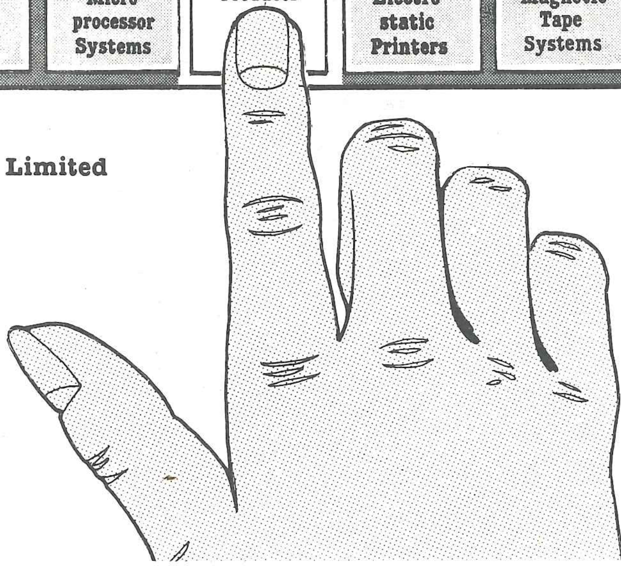

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